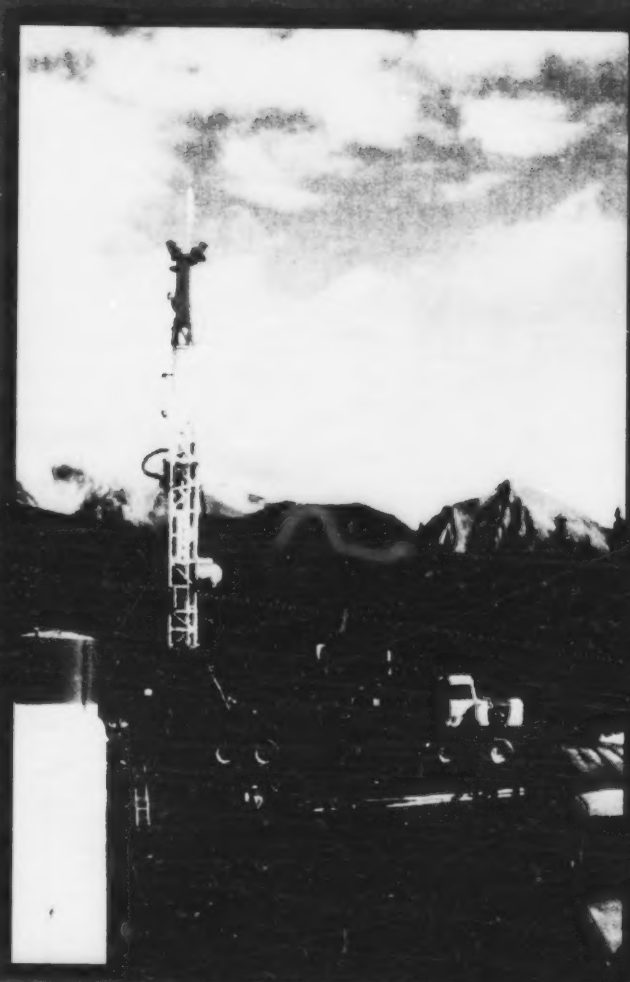


Geofis 2000-7

Coalbed Methane Potential In British Columbia



Revised Feb. 2001

Prepared by Gordon Davidson and Garry Payie

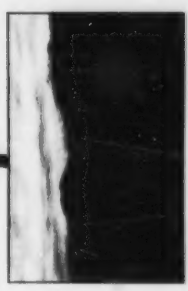


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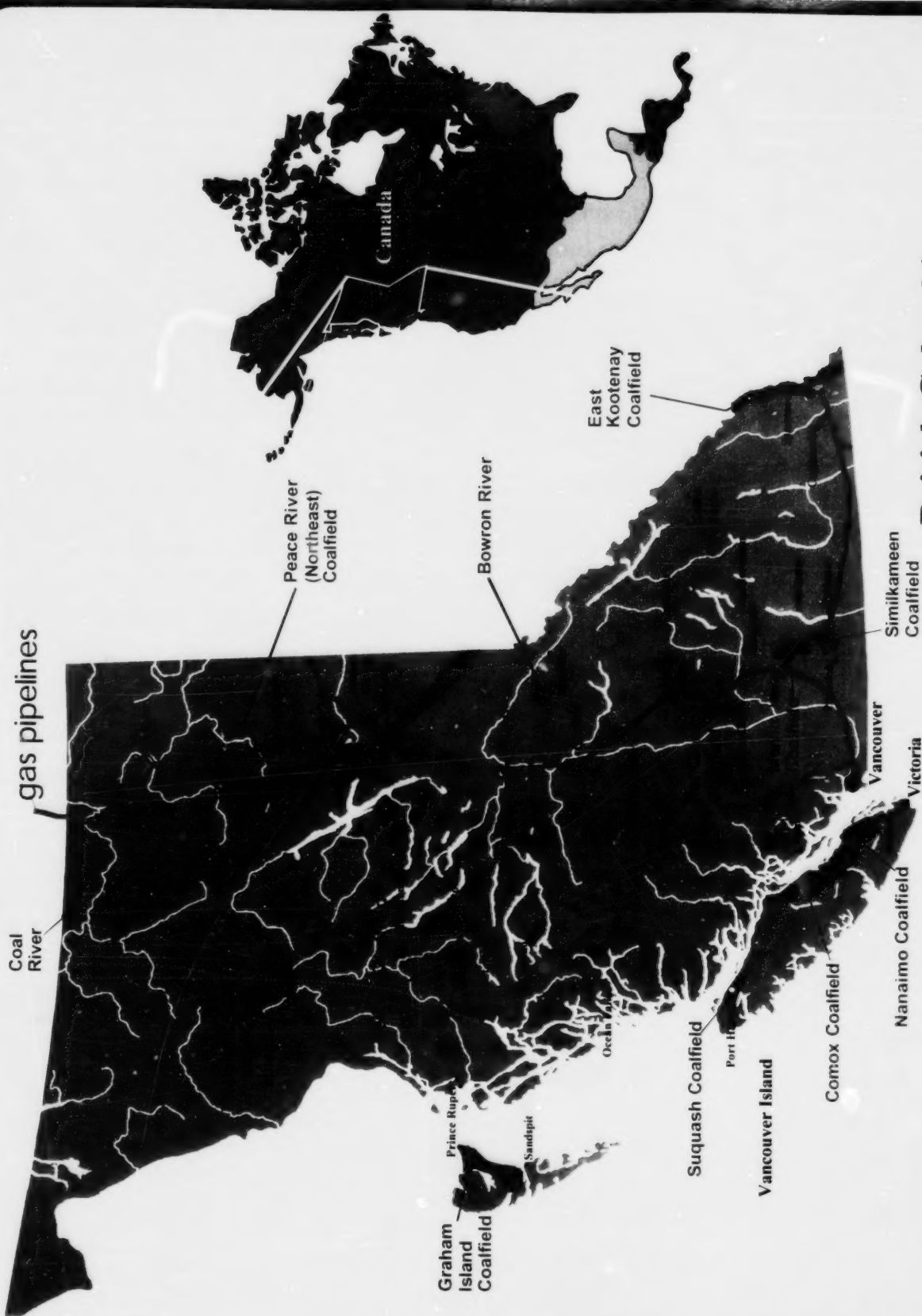
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COALFIELDS AND COALBED METHANE POTENTIAL



Coalbed methane resources are calculated using estimated coal resource, rock and depth data and an appropriate gas content. Very little measured geophysical data are available to confirm the gas content used in the calculations. With the exception of the Kootenay coalfields data which comes from Johnson and Smith (Petroleum Geology Special Paper 1991) all other calculations are by age and are either from CSB publications or internal studies.

NOTE: RECOVERABLE RESERVE WILL BE MUCH LESS THAN THIS ESTIMATE OF POTENTIAL RESOURCE



British Columbia

Introduction

This information booklet provides a brief overview of the major coalfields in British Columbia and the potential of each for coalbed methane. Each coalfield is summarized and is illustrated with simple figures and images.

British Columbia has a measured coal resource of over 3 billion tonnes and a resource available for coalbed methane exploration that exceeds 200 billion tonnes. There is significant potential for coalbed methane in the province but resource definition is still at a preliminary stage. It is estimated that there is 60 Tcf of methane in the Peace River coalfield alone and another 30 Tcf from all other coalfields.

With a well-developed network of gas pipelines already in place, British Columbia affords an exceptional opportunity to those interested in the development of coalbed methane.

If you would like to know more about opportunities for coal and coalbed methane in BC, a list of contacts is included. A list of references for each coalfield, a list of all the coal exploration reports (COALFILE) and their coal borehole data are available on the Ministry of Energy and Mines website, at

www.em.gov.bc.ca/mining/geolsurv/economicgeology/coal

We solicit your feedback and encourage you to contact us about additional data required to initiate your exploration program in British Columbia.

MINISTRY CONTACTS AND DATABASES

Ministry of Energy and Mines (MEM) and Oil and Gas Commission (OGC)

Policy & Regulations - Steve Roberts (MEM)

tel: (250) 952-0204

fax: (250) 952-0922

email: steve.roberts@gems4.gov.bc.ca

Regulations - Larry London (OGC)

tel: (250) 261-5701

fax: (250) 261-5728

email: larry.london@gems5.gov.bc.ca

Oil and Gas Tenure - Gerald German (MEM)

tel: (250) 952-0334

fax: (250) 952-0331

email: gerald.german@gems7.gov.bc.ca

Petroleum Land Titles - Colin Magee (MEM)

tel: (250) 952-0335

fax: (250) 952-0331

email: colin.magee@gems8.gov.bc.ca

Coal Tenure - Denis Lieutard (MEM)

tel: (250) 952-0544

fax: (250) 952-0541

email: denis.lieutard@gems2.gov.bc.ca

Coalbed Methane and Coal Geology - Barry Ryan (MEM)

tel: (250) 952-0418

fax: (250) 952-0381

email: barry.ryan@gems4.gov.bc.ca

Geological data & partnerships:

Derek Brown (MEM)

tel: (250) 952-0432

fax: (250) 952-0381

email: derek.brown@gems6.gov.bc.ca

Mark Hayes (MEM)

tel: (250) 952-0364

fax: (250) 952-0331

email: mark.hayes@gems3.gov.bc.ca

Petroleum Geology and Land Titles - Dave Richardson (MEM)

tel: (250) 952-0359

fax: (250) 952-0331

email: dave.richardson@gems9.gov.bc.ca

For selected references to coalfields in British Columbia, coal databases and information concerning coal and coalbed methane visit the B.C. Geological Survey Branch coal website at: www.em.gov.bc.ca/mining/geolsurv/economicgeology/coal

COALFILE

- the Geological Survey Branch maintains a large library of coal assessment reports in Victoria, dating from 1900 to present - exploration data from the assessment reports have been summarized and stored in a computer information system called COALFILE, which provides a quick and efficient method for handling the large volume of data

Barry Ryan

tel: (250) 952-0418

fax: (250) 952-0381

email: barry.ryan@gems4.gov.bc.ca

Mineral and Coal Tenure

- administers the laws and manages the recording system pertaining to the acquisition and maintenance of mineral, placer and coal rights in the province

www.em.gov.bc.ca/mining/titles

Denis Lieutard

tel: (250) 952-0544

fax: (250) 952-0541

email: denis.lieutard@gems2.gov.bc.ca

Oil and Gas

- the Ministry manages the development of British Columbia's oil, gas and geothermal resources, and implements policies and programs to encourage their economic development and maintain environmental integrity; the Ministry also regulates and inspects the exploration and production operations of the oil, gas and geothermal industries

www.em.gov.bc.ca/oil&gas

Larry London

tel: (250) 261-5700

fax: (250) 261-5728

email: larry.london@gems5.gov.bc.ca

MINFILE

- searches and mineral and coal occurrence information for over 12,000 sites in B.C., available for your PC and on the Internet

www.em.gov.bc.ca/mining/geolsurv/minfile

George Owsiacki

tel: (250) 952-0389

fax: (250) 952-0381

email: george.owsiacki@gems4.gov.bc.ca

ARIS (Assessment Reports)

- 50 years of exploration records and searchable data on over 26,000 reports

www.em.gov.bc.ca/mining/geosurv/aris

Allan Wilcox

tel: (250) 952-0390

fax: (250) 952-0381

email: allan.wilcox@gems3.gov.bc.ca

The MapPlace and Mineral Potential

- the MapPlace provides powerful, interactive map-based access to Ministry databases including mineral and coal tenure

www.em.gov.bc.ca/mapplace

Larry Jones

tel: (250) 952-0386

fax: (250) 952-0381

email: larry.jones@gems5.gov.bc.ca

Ministry Publications

- the ministry produces a wide range of documents for public information - some ministry publications are only available by contacting:

Crown Publications

tel: (250) 386-4636

fax: (250) 386-0221

email: crown@pinc.com

www.crownpub.bc.ca

Energy Data Centre

- is the depository for geological and geophysical reports submitted by industry plus all other well and test hole data as required by the Petroleum and Natural Gas Act

Location:

6th Floor, 1810 Blanshard St.

Victoria, B.C. V8W 9N3

Steven Glover

tel: (250) 952-0293

fax: (250) 952-0291

email: steven.glover@gems1.gov.bc.ca

Ministry of Energy and Mines

Location:

1810 Blanshard St.

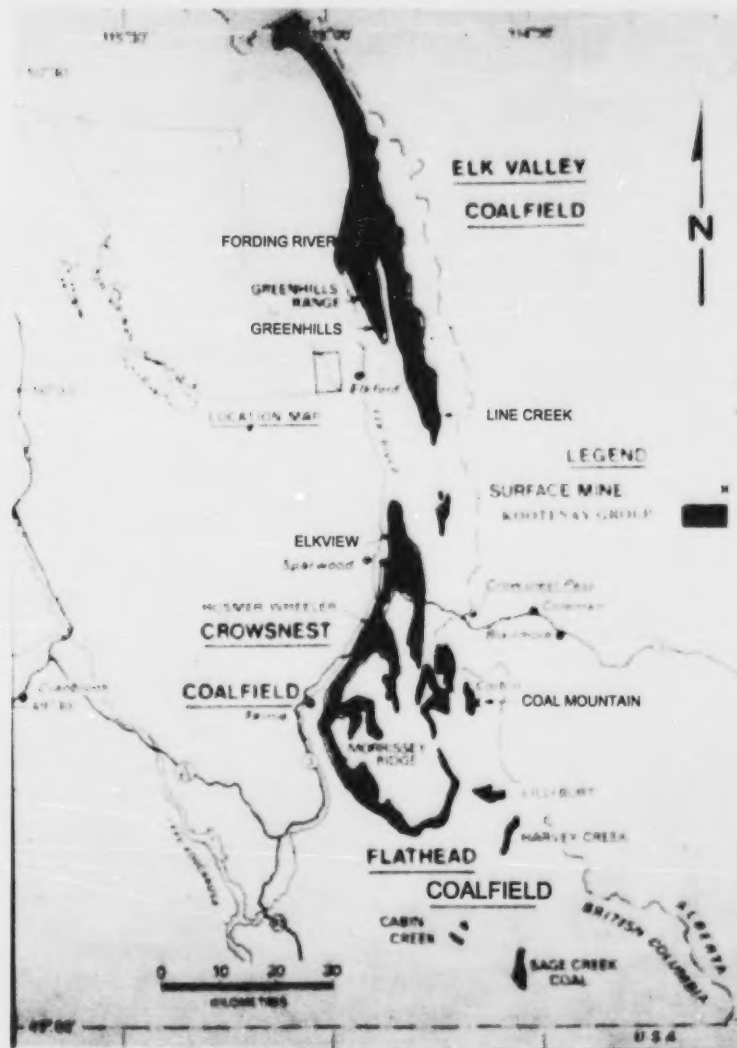
Victoria, B.C. V8W 9N3

tel: (250) 952-0429

fax: (250) 952-0381

Ministry website: www.em.gov.bc.ca

EAST KOOTENAY COALFIELDS



- the East Kootenay Coal District comprises three structurally separate coalfields and are named from north to south: Elk Valley, Crowsnest, Flathead
- coal exploration and mining activities in the district have been continuous since the late 1800s
- commercially significant coal occurs within the Mist Mountain Formation which ranges from less than 240 metres to nearly 1000 metres in stratigraphic thickness; the formation averages 500 to 600 metres thick
- coal beds comprise 8 to 12 per cent of the total stratigraphic thickness and attain thicknesses in excess of 18 metres
- most coal beds occur in the lower part of the formation where they tend to be thicker and more persistent
- coal rank varies between low and high volatile bituminous in the district, and can change within individual beds both along strike and downdip as well as between structural domains - the highest rank coals are exposed in parts of the Crowsnest coalfield
- the average ash content of currently mined East Kootenay coals ranges between 15 and 25 per cent - the diversity of composition and rank has resulted in coals ranging from high quality coking varieties to coals that have no caking capacity
- maceral composition trends suggest an increase in vitrinite content and decrease in inertinite from the base of the formation upward
- the major structural features of the East Kootenay district are large open synclinoria bounded by low to high angle thrusts or normal faults - these synclinal structures may be attractive coalbed methane targets
- to date all of the coalbed methane exploration has occurred in the Elk Valley and Crowsnest coalfields - this region has been the focus for much of the recent coalbed methane exploration in Canada

GENERAL COAL QUALITY CHARACTERISTICS EAST KOOTENAY COAL DISTRICT

Proximate analysis

(per cent by weight)

moisture (as received)	3-6
ash (dry)	15-35
volatile matter (d.a.f.)*	20-35
fixed carbon (d.a.f.)	65-80

Heat value (d.a.f.) MJ/kg	33-38
----------------------------------	-------

Ultimate analysis (dry, ash-free)

(per cent by weight)

carbon	87.5
hydrogen	5.5
nitrogen	1.5
sulphur	0.5
oxygen	5.0

Analysis of ash

(per cent by weight)

SiO ₂	55.0
Al ₂ O ₃	25.0
Fe ₂ O ₃	4.0
CaO	4.0
MgO	1.5
MnO	-
Na ₂ O	0.1
K ₂ O	1.0
P ₂ O ₅	1.0
TiO ₂	1.0
SO ₃	2.0
undetected	5.4

Petrographic indices

(per cent by weight)

mean max. reflectance (R _G max)	1.05-1.50
total reactives	55-80
total inerts	20-45

Properties

free swelling index	5-8
caking index (Gray)	45-55
grindability index (Hardgrove)	100+
ash softening temp. (reduce °C)	1260+
maximum dilatation	-10 to 100
maximum fluidity (ddpm)	3 to 1500
ASTM coke strength	40-62

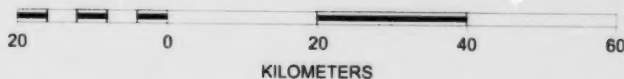
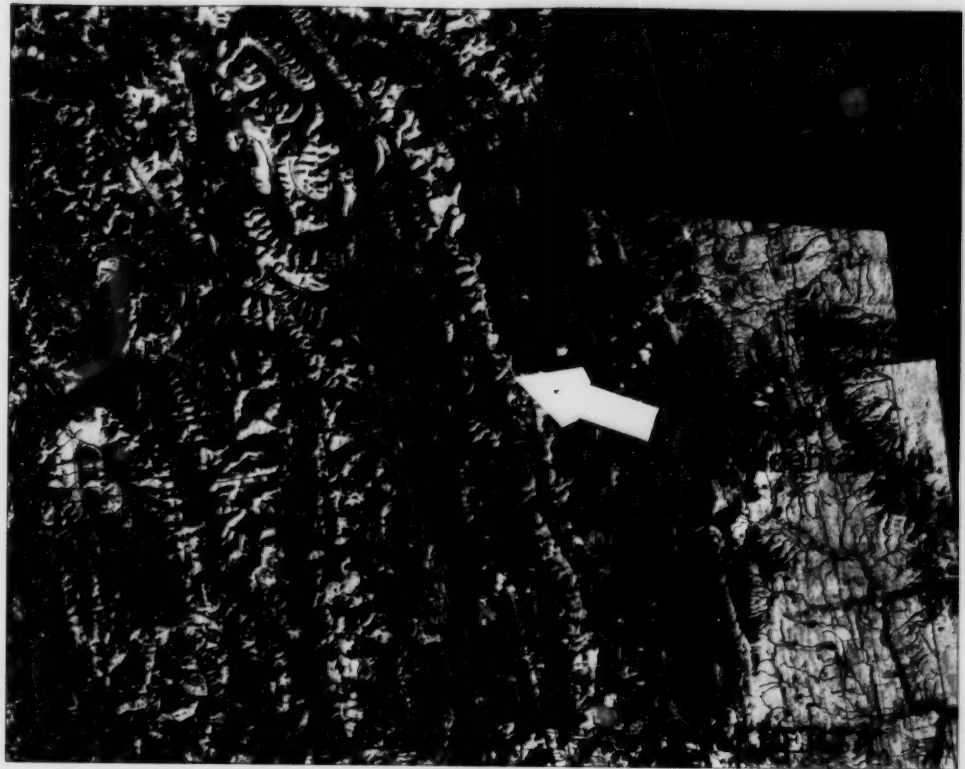
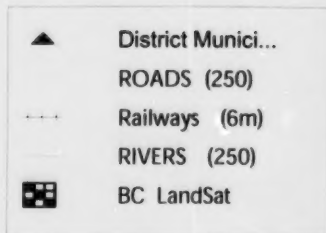
Rank classification (ASTM)	hvb-mvb-lvb
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*dry, ash-free

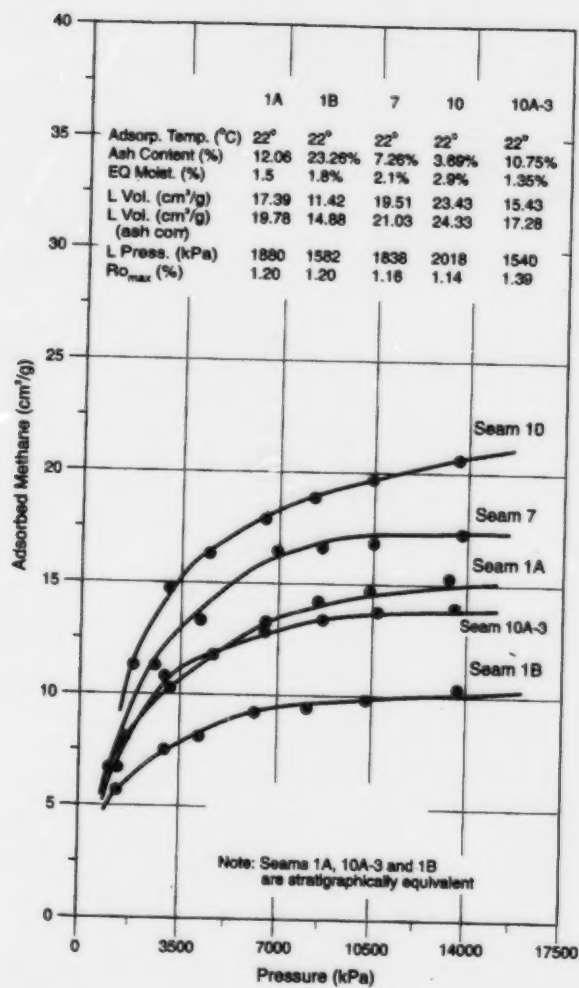
These generalized coal characteristics result from the synthesis and consideration of information from several sources, including Nicolls (1952), Swartzman (1953), Romaniuk and Naidu (1984), and Pearson and Grieve (1985). Values do not necessarily result from representative sampling of deposits and, therefore, are intended only as an indication of general coal characteristics that might be expected in the East Kootenay Coal District.

(Smith, G.G. 1989)

ELK VALLEY



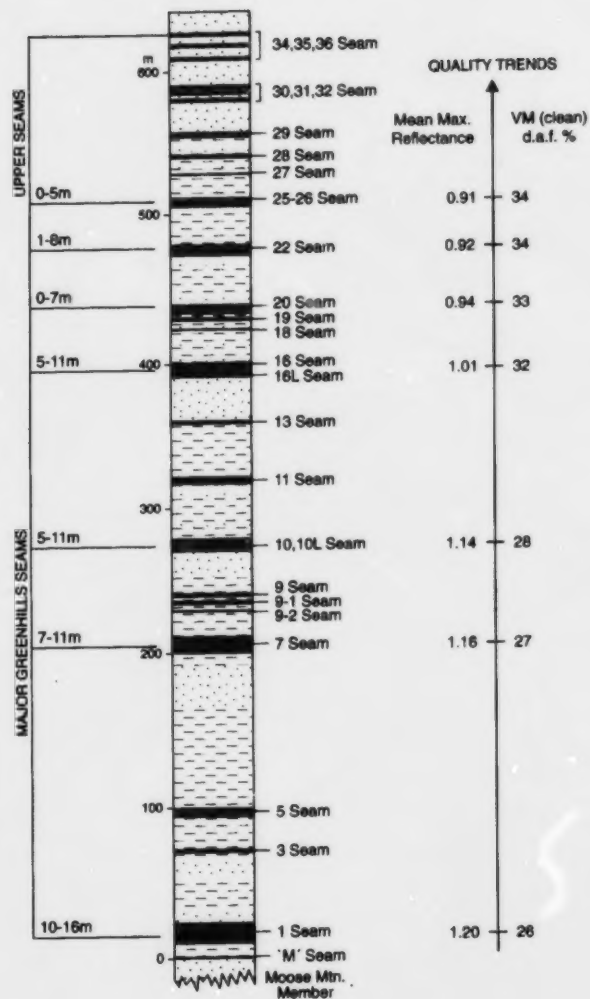
- the Mist Mountain section in the north end of the field is 500 to 580 metres thick and contains about 66 metres of cumulative coal - the section in the south end of the field is 550 metres thick and contains upwards of 70 metres of coal
- the Elk Valley coalfield consists of two north trending synclines separated by a major normal fault
- there is a history of coalbed methane exploration in the field: in 1981, CANMET desorbed samples from 3 holes over a depth of 0 to 400 metres; Fording drilled a single hole in 1993 into the core of the Greenhills Syncline; Norcen drilled 4 stratigraphic holes in the northern part of the field in 1991 and in 1992 drilled a limited production test well; Suncor drilled a single hole in 1998 but data are not public and Suncor did not follow up on the exploration
- the coal resource to a depth of 1500 metres in the Elk Valley coalfield is estimated to be 19 billion tonnes with an estimated coalbed methane resource of 7.7 Tcf



*Adsorption Isotherms of coal samples from
the Mist Mountain Formation, Elk Valley coalfield.*

(Dawson, F.M., 1995)

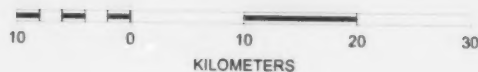
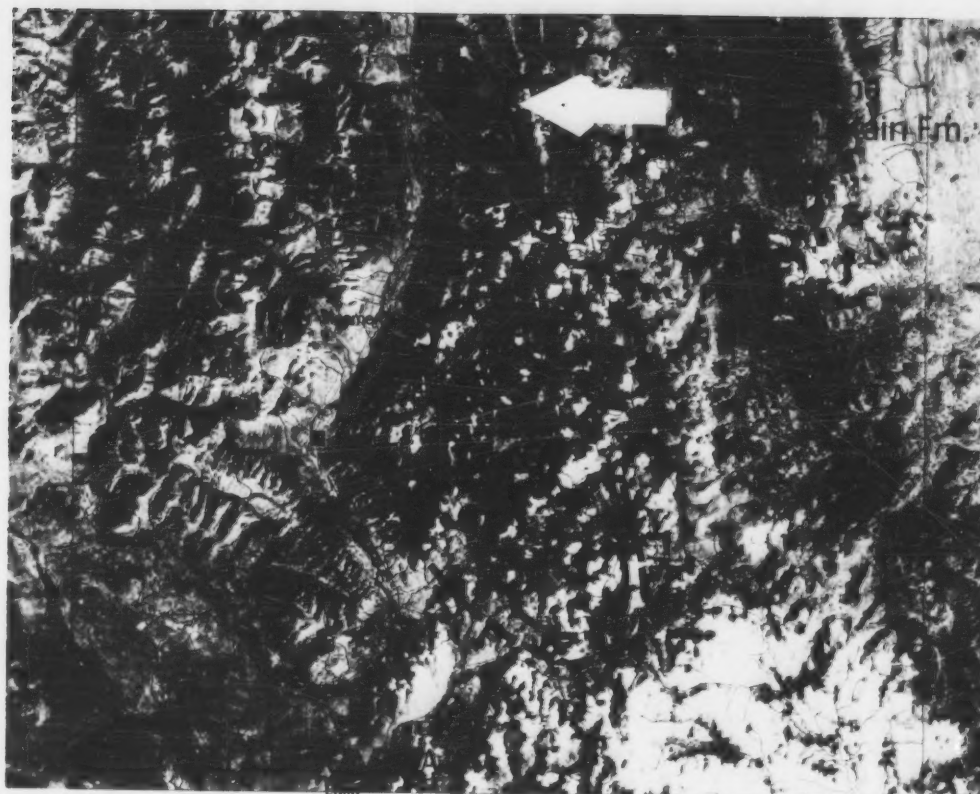
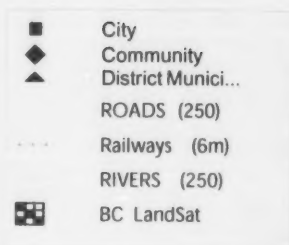




Typical stratigraphic section of the Mist Mountain Formation, Greenhills mine, Elk Valley

(Dawson, F.M., 1995)

CROWSNEST

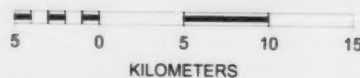
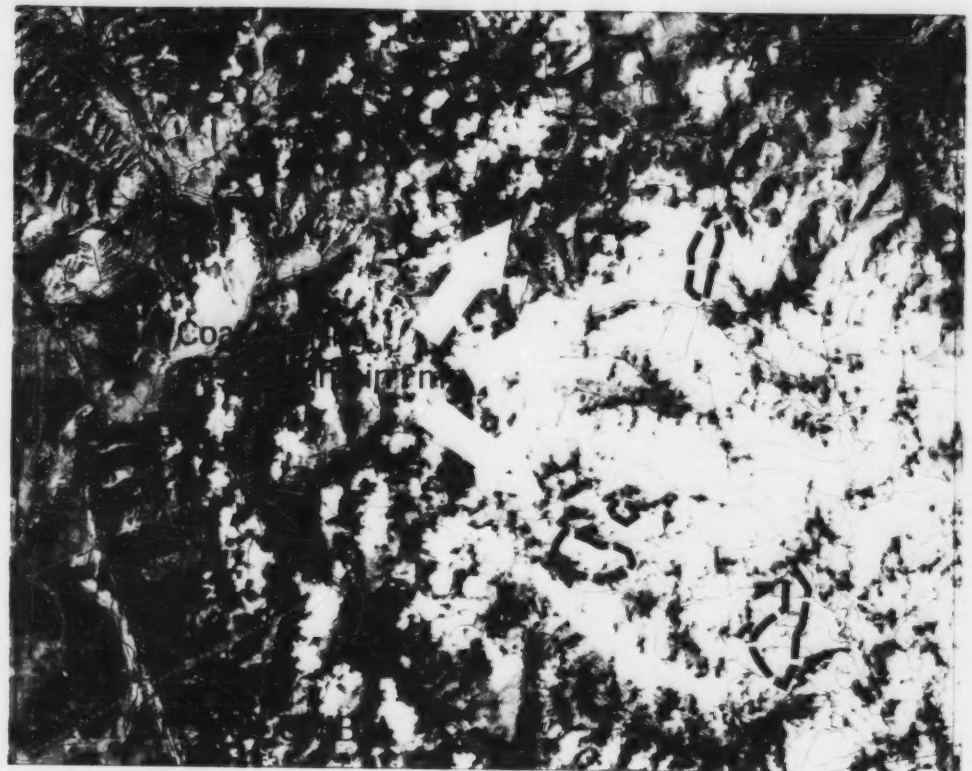


- the Crowsnest coalfield has a coal resource of over 25 billion tonnes and a potential coalbed methane resource of 12 Tcf
- the structure is that of a large basin cored by Elk Formation and almost completely rimmed by outcrops of the Mist Mountain Formation
- coal rank varies around the perimeter and downdip
- coalbed methane exploration in the field consisted of three companies drilling stratigraphic holes: Mobil/Chevron drilled two holes; Gulf Canada drilled two holes in 1990; and Saskoil drilled four holes



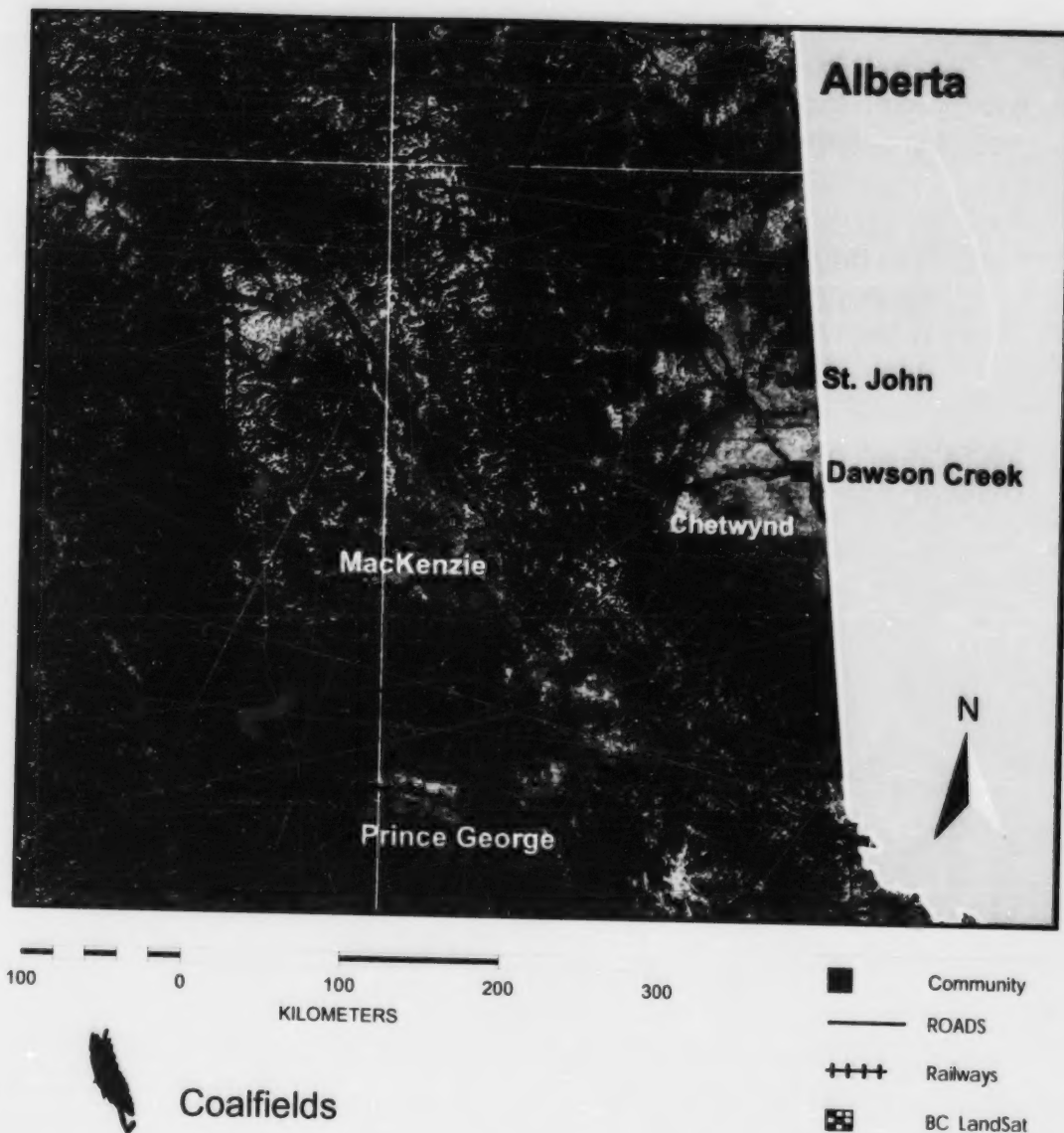
FLATHEAD

- ◆ Community
- ROADS (250)
- Railways (6m)
- RIVERS (250)
- BC LandSat



- the Flathead coalfield consists of a number of remnants of the Mist Mountain Formation, the largest of which is Sage Creek near the US border
- the Mist Mountain Formation in the Sage Creek area ranges from 198 to 259 metres in thickness; coal occurs in five horizons having an aggregate thickness of approximately 30 metres
- measured resources for Flathead are 70 million tonnes, indicated resources are 150 million tonnes and inferred resources are 200 million tonnes
- coalbed methane potential is limited

Peace River Coalfields



- High to Low Volatile Bituminous coal deposits occurs in the Lower Cretaceous Gething and Gates formations
- The coal resource to a depth of 2000 metres is estimated to be about 140 billion tonnes



Peace River Coalfield

- The Gething Formation is up to 1036 metres thick and contains more than 100 coal beds ranging in thickness from a few centimetres up to 4.3 metres. It thins progressively to the south
- The Gates Formation is up to 280 metres thick and contains 11 coal beds up to 10 metres thick that have an aggregate thickness of up to 46 metres. It does not contain coal in the northern part of the field
- Two major mines (Quintette and Bullmoose) were established by the early 1980s and several other properties have reached advanced stages of exploration

General Coal Quality Characteristics of Peace River Coal

Proximate analysis (% by weight)

Moisture (as received)	1-8
ash (dry)	5-20
volatile matter (dry ash free)	21-26
fixed carbon (dry ash free)	74-79

Calorific Value (dry, ash-free)

34.5-36.5

Ultimate analysis (dry, ash-free)(% by weight)

carbon	90.0
hydrogen	5.0
nitrogen	1.5
sulphur	0.5
oxygen	3.0

Petrographic indices

mean max. reflectance (R_{max})	1.0-1.5
total reactives	70
total inerts	30

Properties

free swelling index	1-7
caking index (Gray)	-
grindability index (Hardgrove)	90+
ash softening temp. (Reduce- °C)	1250+

Rank Classification (ASTM)

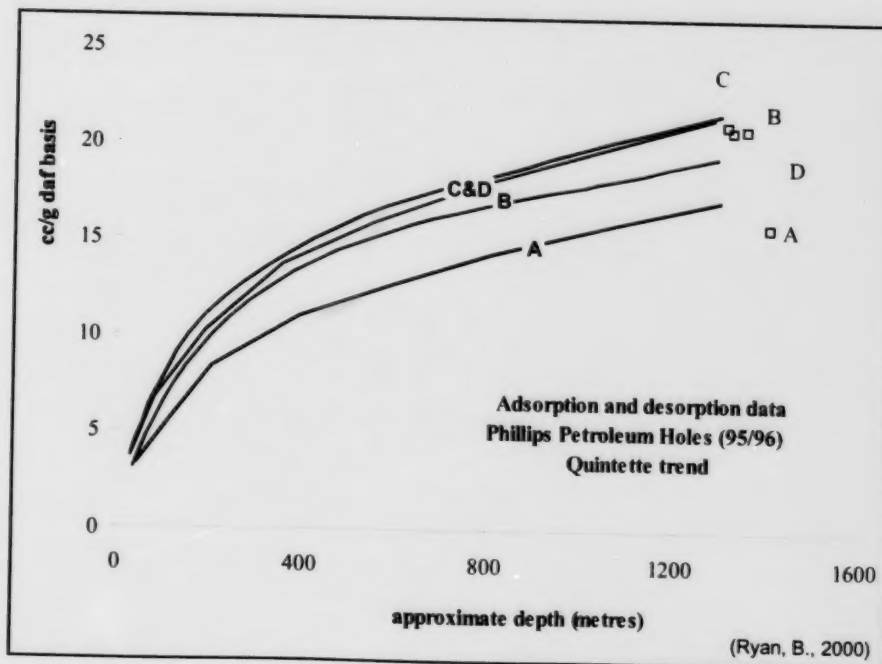
h-lvb

(Smith, G.G., 1989)

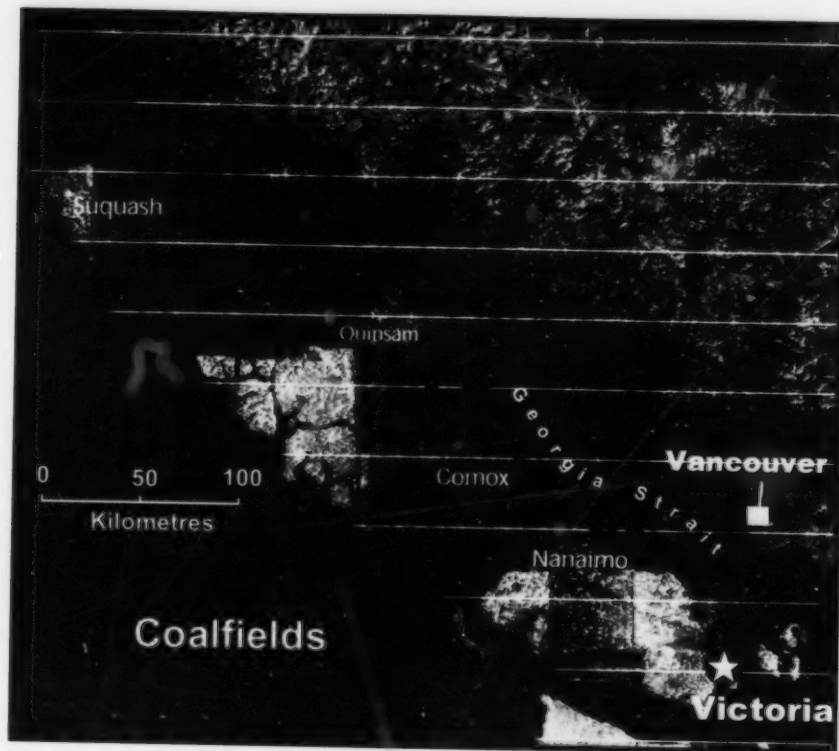
Peace River Coalfield

Methane Potential

- Coalbed methane potential has been estimated at 60 Tcf, to a depth of 2000 metres
- Analyses of Gates Formation samples indicates high adsorption capacity of samples with varying maceral composition
- Four holes drilled by Phillips Petroleum in 95/96 encountered coal averaging 20 metres at depths ranging from 1200 to 1550 metres. Gas contents ranged from 6 to 26 cc/g on an as received basis
- Four adsorption isotherms from samples from one of the Phillips wells gave Langmuir volumes ranging from 19.8 to 25 cc/g on an as received basis
- Comparison of adsorption and desorption data indicates that seams are close to saturated



Vancouver Island Coalfields



- Coal is present in Upper Cretaceous Nanaimo Group strata, concentrated in three main coalfields: Nanaimo, Comox and Suquash
- Predominant coal rank high volatile bituminous
- The Nanaimo and Comox coalfields consist of simple gently dipping open folds offset by several large scale shear zones
- Coal has been mined to a depth of 450 metres but the coal measures have been traced to a depth of 1200 metres
- Various estimates of present coal resources to a depth of 2000 metres range from 800 to 6920 million tonnes and average 3850 million tonnes



Significant Coal Resources on Vancouver Island of Immediate interest

Coalfield	Predominant Rank	Measured	Indicated	Inferred
(millions of tonnes)				
Nanaimo	hvb	-	-	10
Comox	hvb	10	50	100
Quinsam**	hvb	25	30	50
Suquash	hvb	-		40
Totals	h-mvb	35	80	200

**considered part of the Comox coalfield

(Smith, G.G., 1989)

General Coal Quality Characteristics of Vancouver Island

	Nanaimo	Comox	Quinsam**
Proximate analysis (per cent by weight)			
moisture (as received)	5	4	6
ash (dry)	14	14	17
volatile matter (d.a.f.)*	41	38	42
fixed carbon (d.a.f.)	59	62	58
Heat value (d.a.f.) MJ/kg	34.5	34.5	33.5
Ultimate analysis (dry, ash-free) (per cent by weight)			
carbon	83.0	83.0	-
hydrogen	5.5	5.5	-
nitrogen	1.5	1.2	-
sulphur	0.5	1.5	1.1
oxygen	9.5	8.8	-
Analysis of ash (per cent by weight)			
SiO ₂	37.5	30.0	-
Al ₂ O ₃	20.5	18.5	-
Fe ₂ O ₃	6.5	14.5	-
CaO	21.0	17.5	-
MgO	5.0	2.0	-
MnO	0.1	-	-
Na ₂ O	1.1	0.5	-
K ₂ O	0.9	0.6	-
P ₂ O ₅	0.8	0.5	-
TiO ₂	1.1	1.0	-
S ₂ O ₃	4.0	13.0	-
undetected	1.5	1.9	-
Properties			
free swelling index	1-6	6-8	-
caking index (Gray)	45-63	65	-
grindability index (Hardgrove)	67	65	-
ash softening temp. (reduce-10)	1265	1160	-
Rank classification (ASTM)	hvbA/B	hvbA/B	hvbB

*dry, ash-free

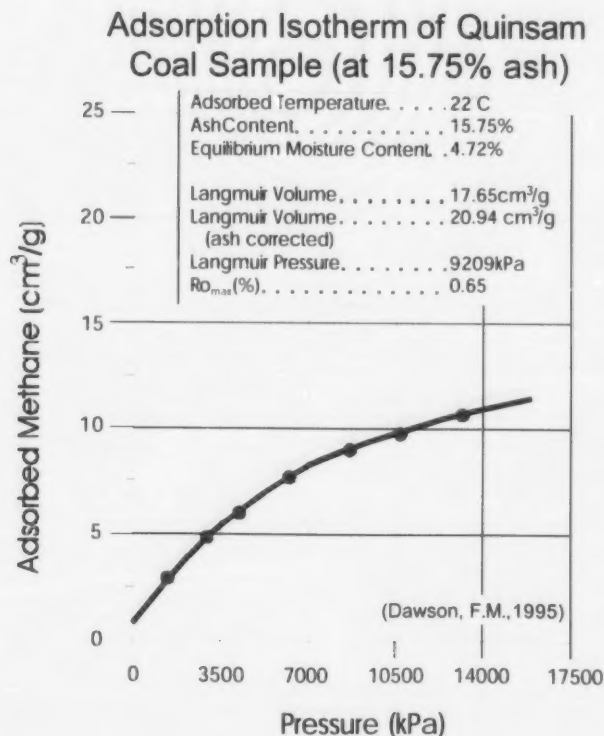
**considered part of the Comox coalfield

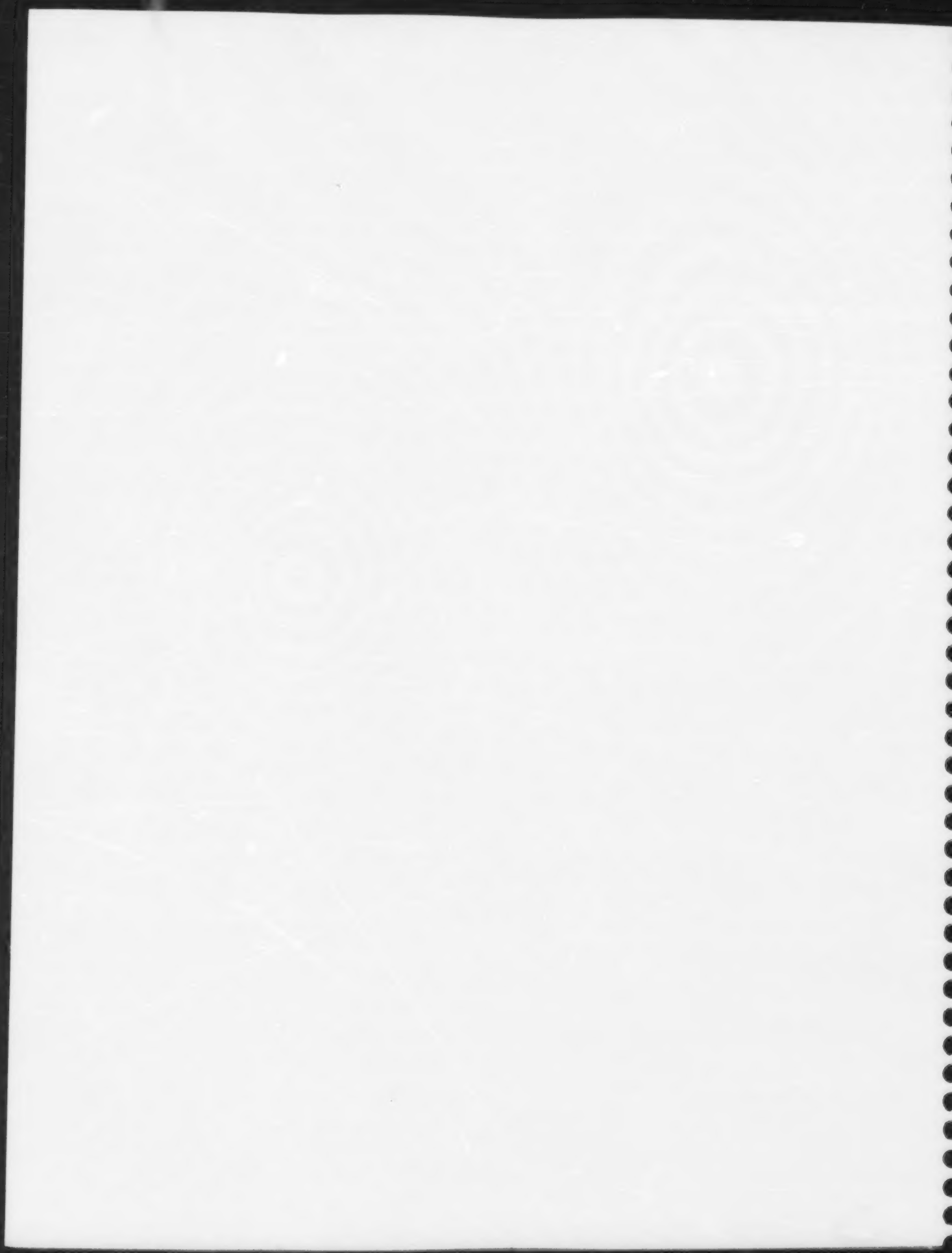
(Smith, G.G., 1989)

Vancouver Island Coalfields

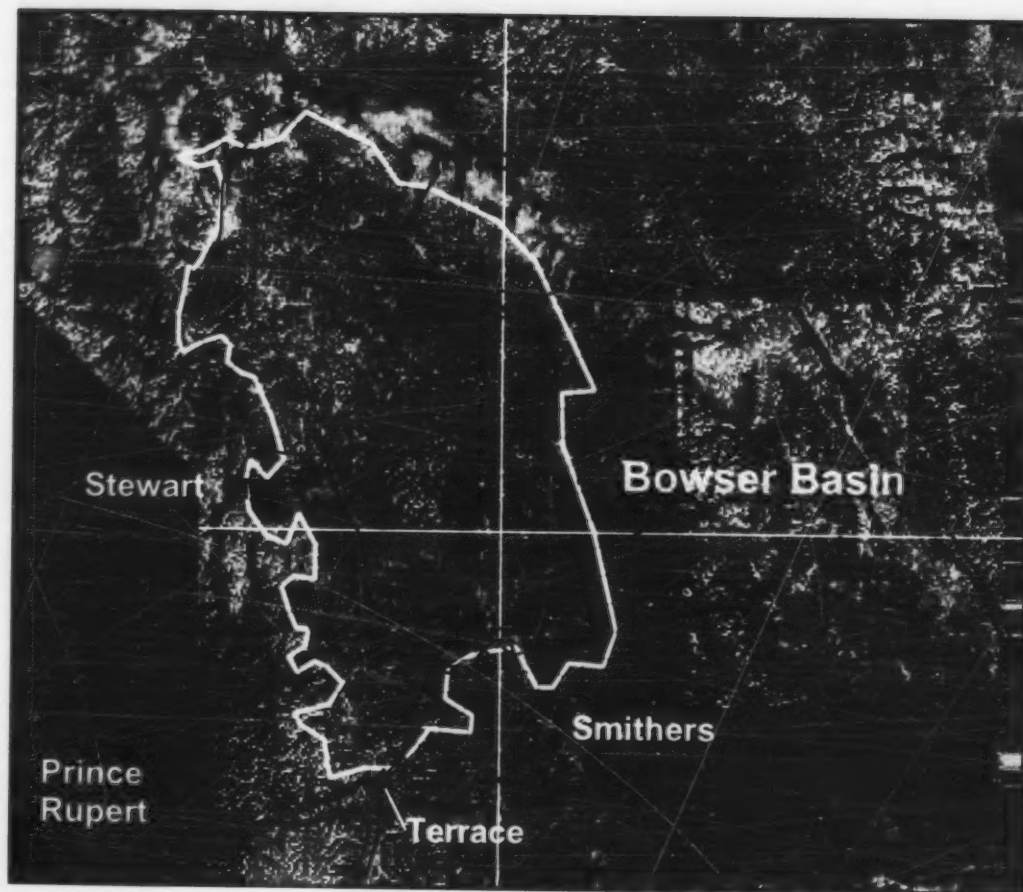
Methane Potential

- Coal seams in the Nanaimo basin had the reputation of being very gassy below 200 metres
- Desorption tests on the Douglas seam in the Nanaimo basin indicated gas contents in the range of 173 to 259 scf/ton (6 to 12.5 x 10⁶ m³/tonne)
- In the Nanaimo coalfield, most of the methane potential will occur outboard of Vancouver Island as the major coal seams dip eastward into Georgia strait
- Total resource estimates for Vancouver Island range from 1.6 Tcf (45 billion cubic metres) to 0.5 Tcf (14 billion cubic metres)
- Average methane resource estimates for the three coalfields are: Comox, 800 Bcf; Nanaimo, 300 Bcf; and Suquash, 60 Bcf
- Gas pipeline passes through Comox and Nanaimo coalfields





Klappan and Groundhog Coalfields



100 0

100 200

300

KILOMETERS



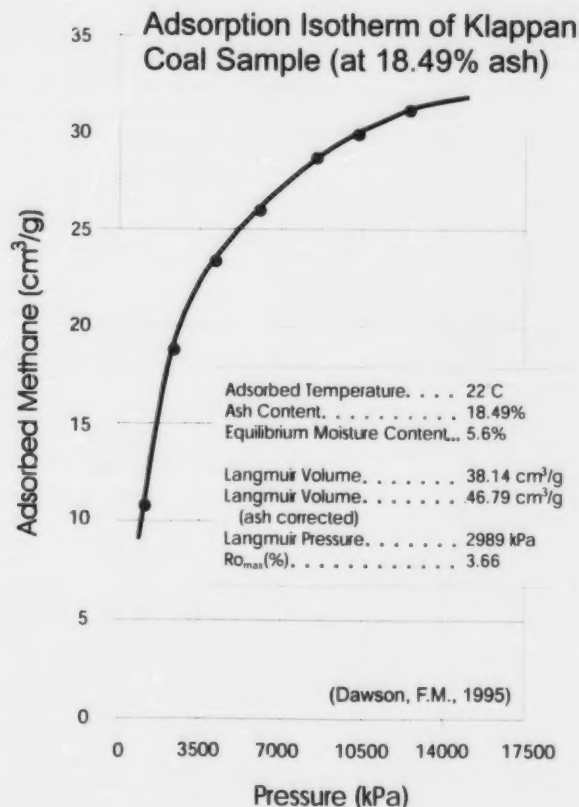
Outline of
Coalbearing
Formation

N

- Community
- ROADS
- +++ Railways
- Gas Pipeline
- BC LandSat

Klappan and Groundhog Coalfield

- Semi-anthracite and anthracite occur within the 350 to 1200 metre (average - 725 metres) thick Late Jurassic to Lower Cretaceous Currier Formation
- Coal seams range up to 6 metres in thickness
- Coals are relatively high in ash (15-35 %)
- Reflectance values average 3.9% R_o max
- A total coal resource estimate for Klappan and Groundhog is 37 billion tonnes to a depth of 2000 metres
- The Groundhog and Klappan coalfields contain a potential methane resource of 8.1 Tcf (214 billion cubic metres)



HAT CREEK COALFIELD

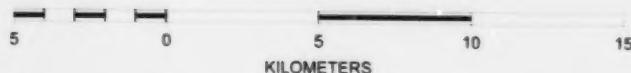
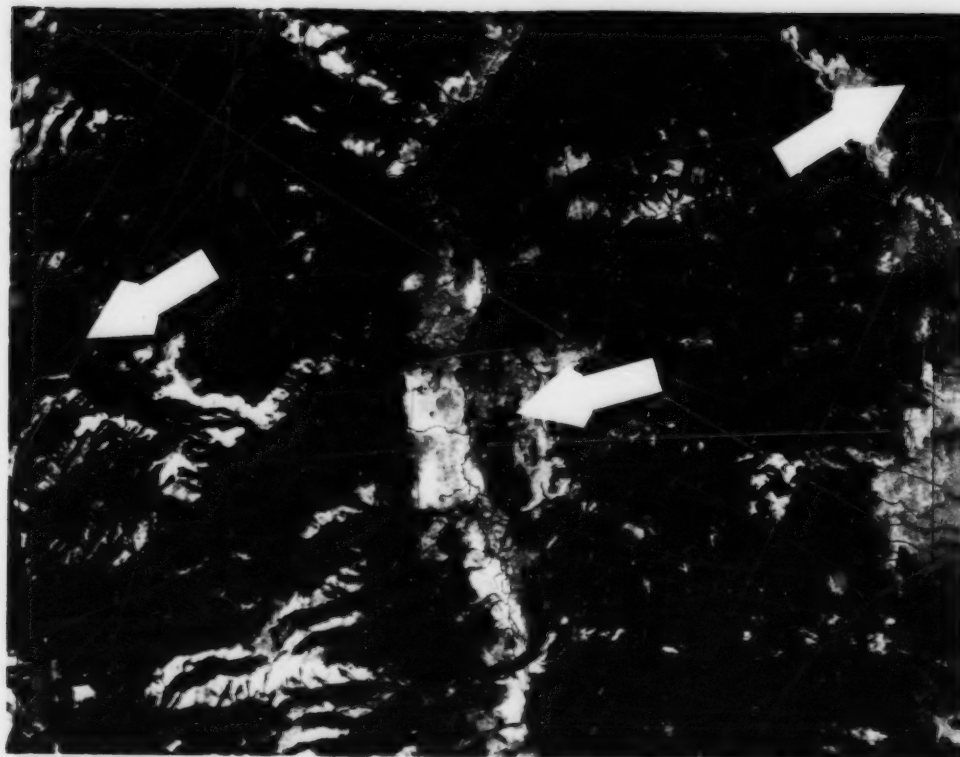
ROADS (250)

Railways (6m)

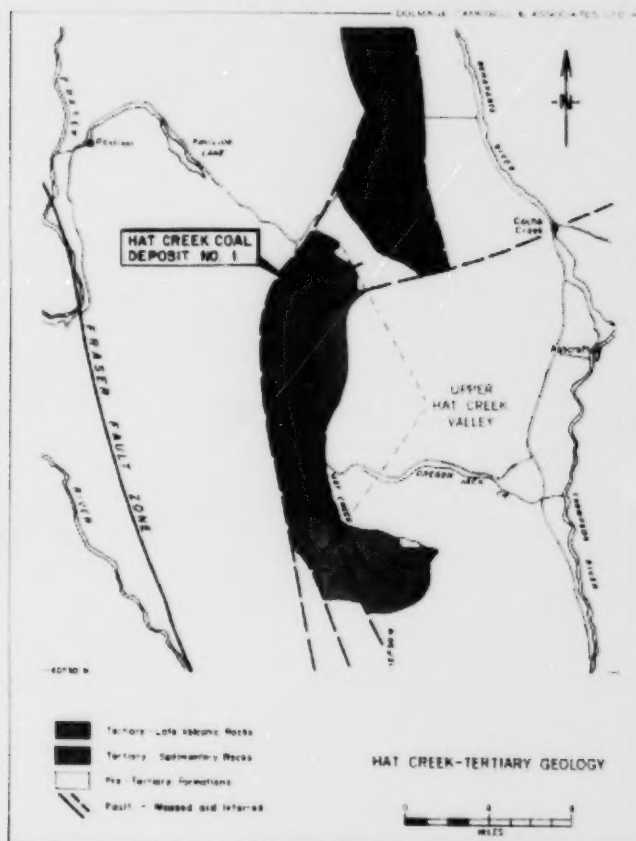
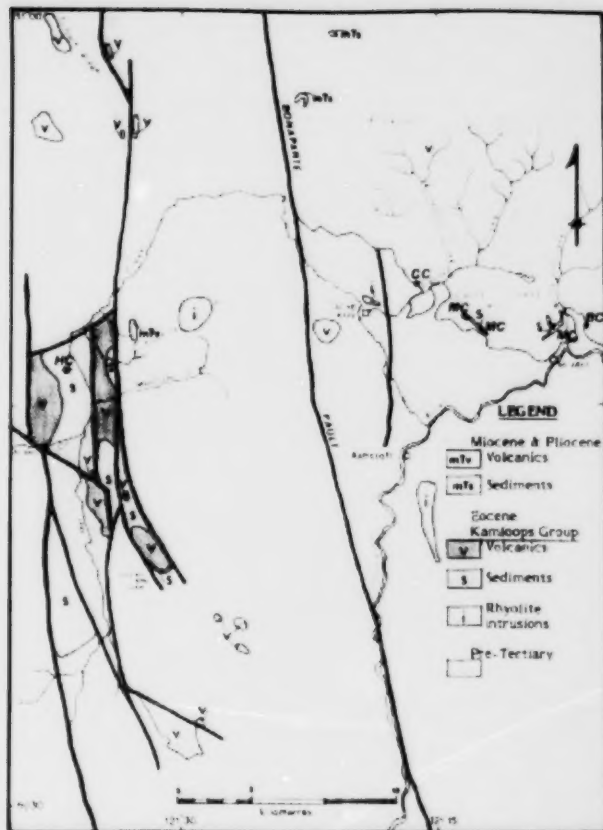
Streams (1:50k)

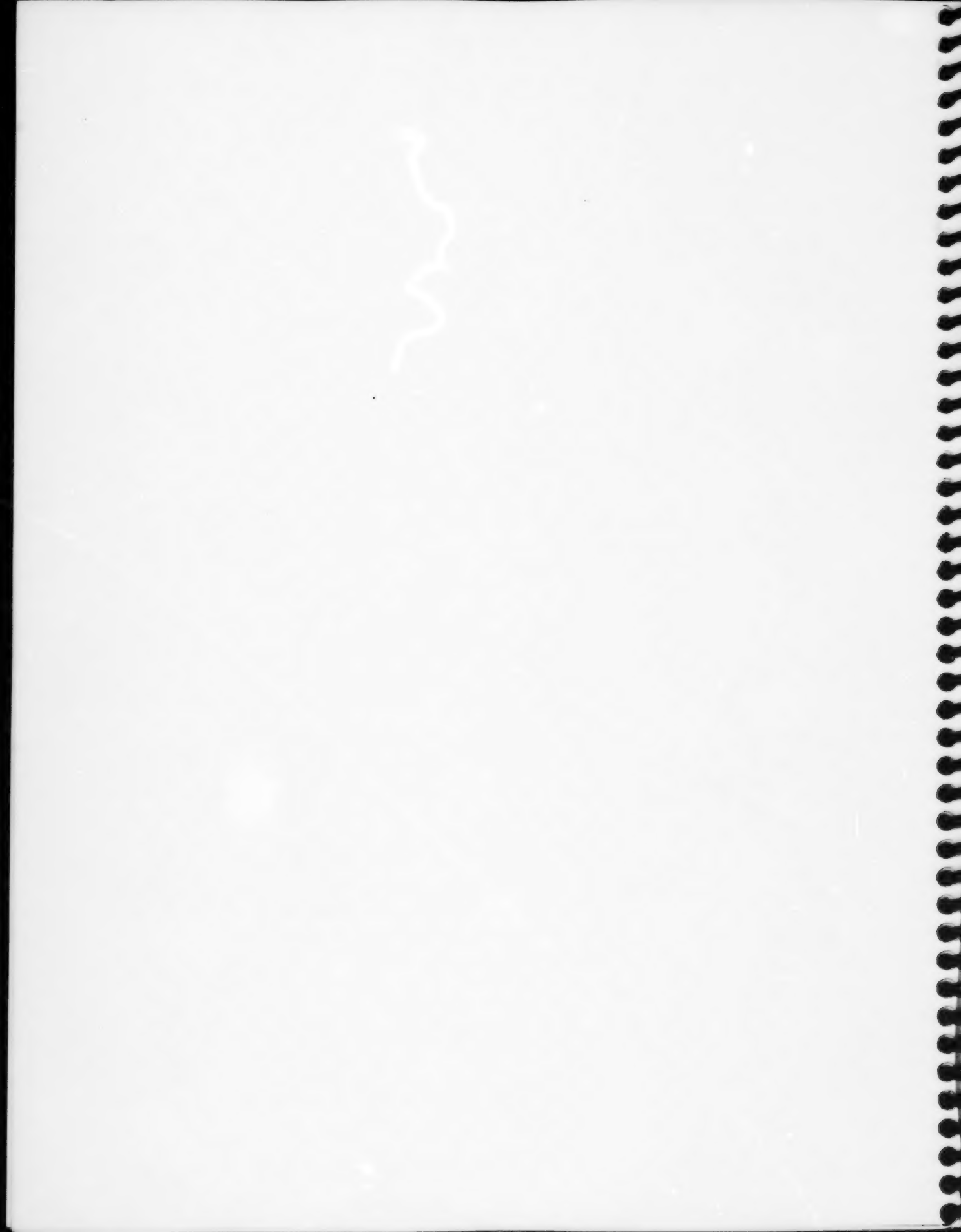


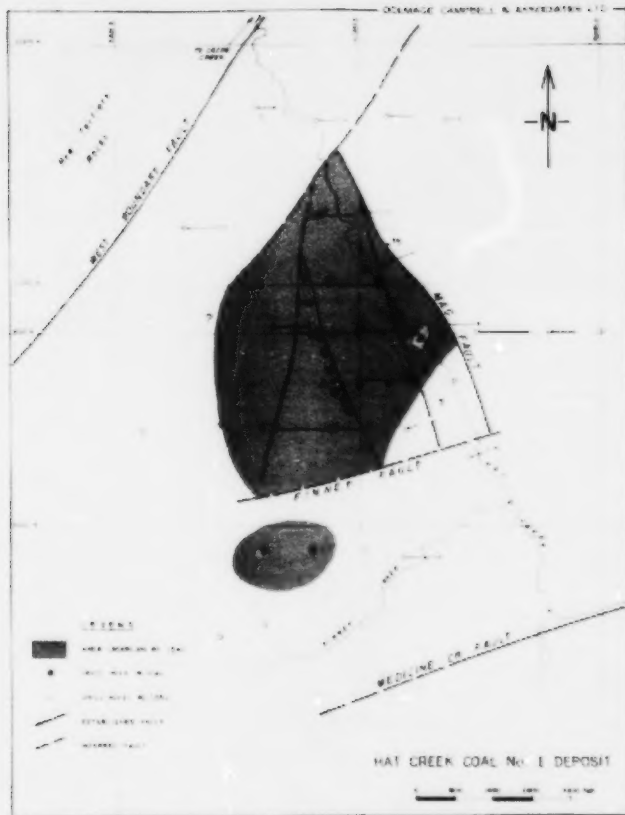
BC LandSat



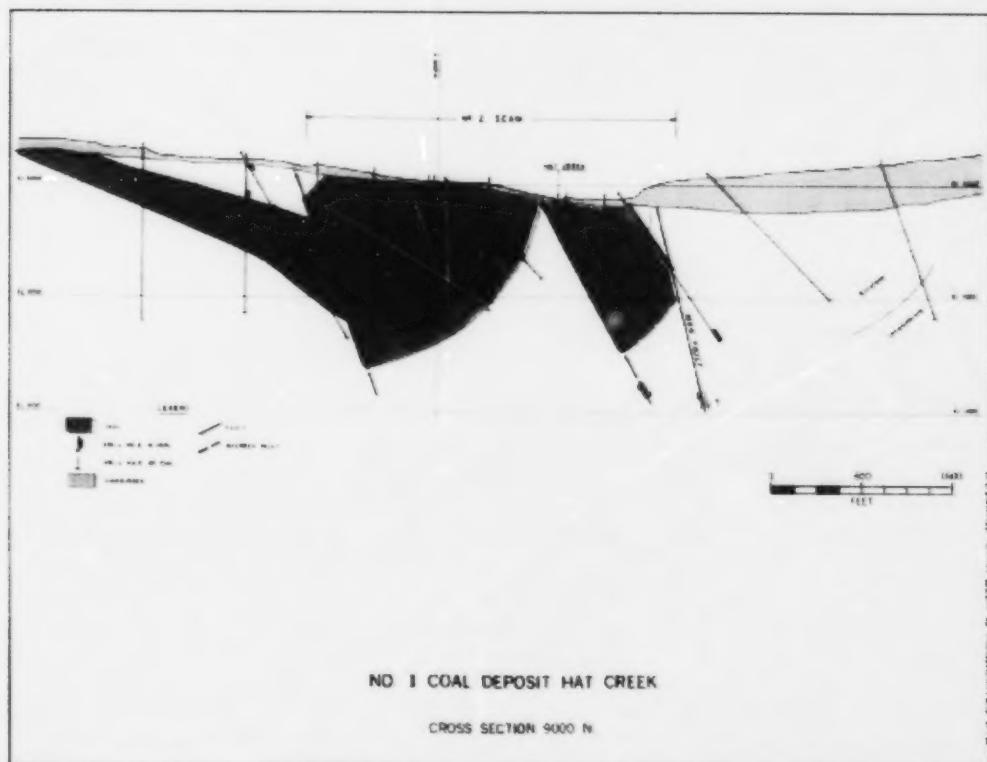
- thick beds of coal along Hat Creek were first reported in 1879
- the northerly trending Hat Creek Valley is underlain by Tertiary sediments and volcanic rocks contained within a graben about 25 kilometres long and 4 kilometres wide
- the coal measure is a 350 to 550 metre thick succession named the Hat Creek Formation
- the Hat Creek coalfield contains the world's thickest known coal deposit, and probably the greatest concentration of coal - intensive exploration of the coalfield in recent years indicates the existence of in excess 2 billion tonnes of lignitic to sub-bituminous coal in the No. 2 deposit
- the No. 1 deposit comprises two south plunging half-synclines truncated on the southeast end by northeast trending gravity faults
- the rank of coal varies from lignite A to sub-bituminous C
- measured resources of the No. 1 deposit are 440 million tonnes, indicated resources are 300 million tonnes and inferred resources are 200 million tonnes
- because of the large coal tonnages even with low gas contents, there could still be a coalbed methane resource of about 0.5 Tcf - much of the methane will be of biogenic origin







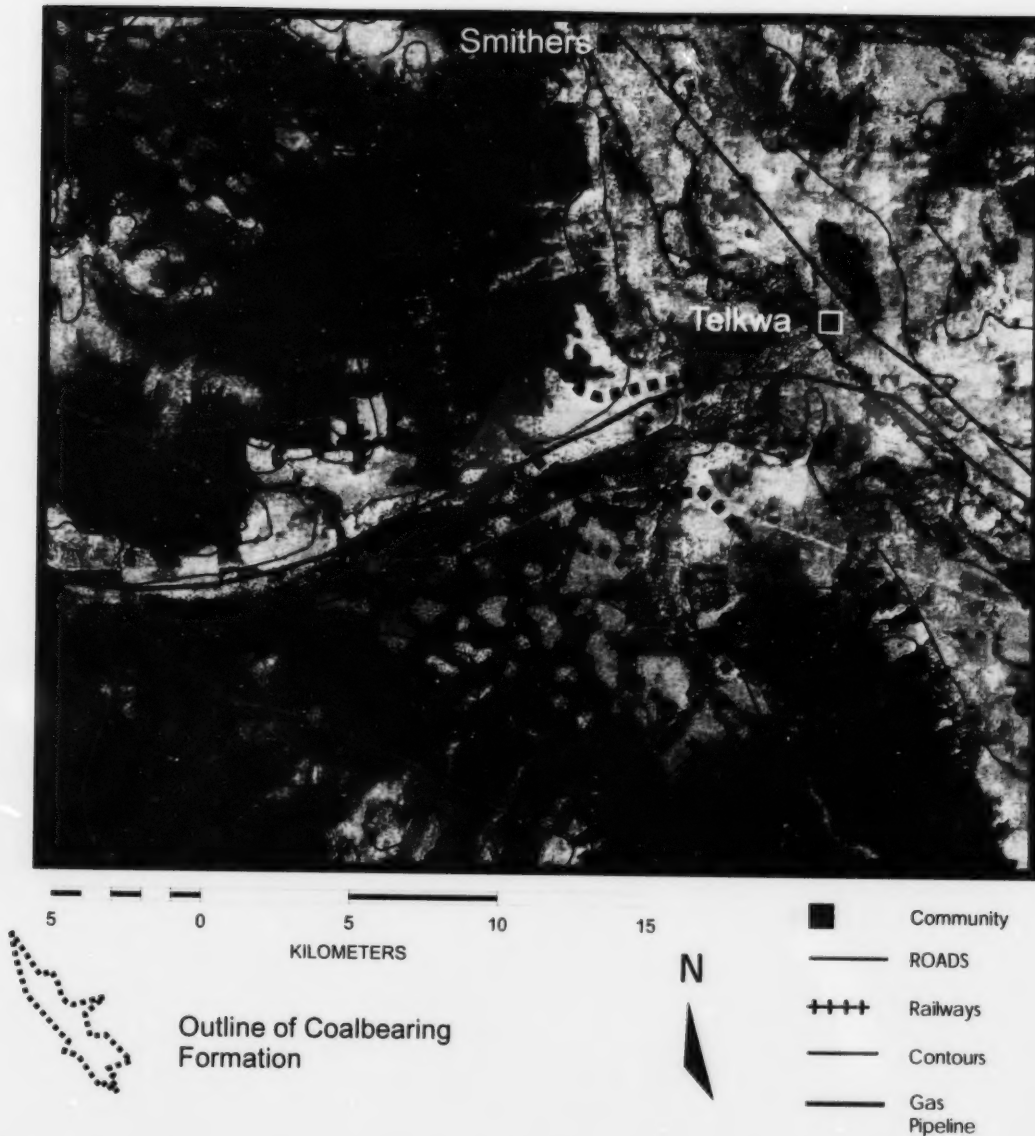
(Dolmage Campbell & Associates Ltd., 1975)



(Dolmage Campbell & Associates Ltd., 1975)



Telkwa Coalfield

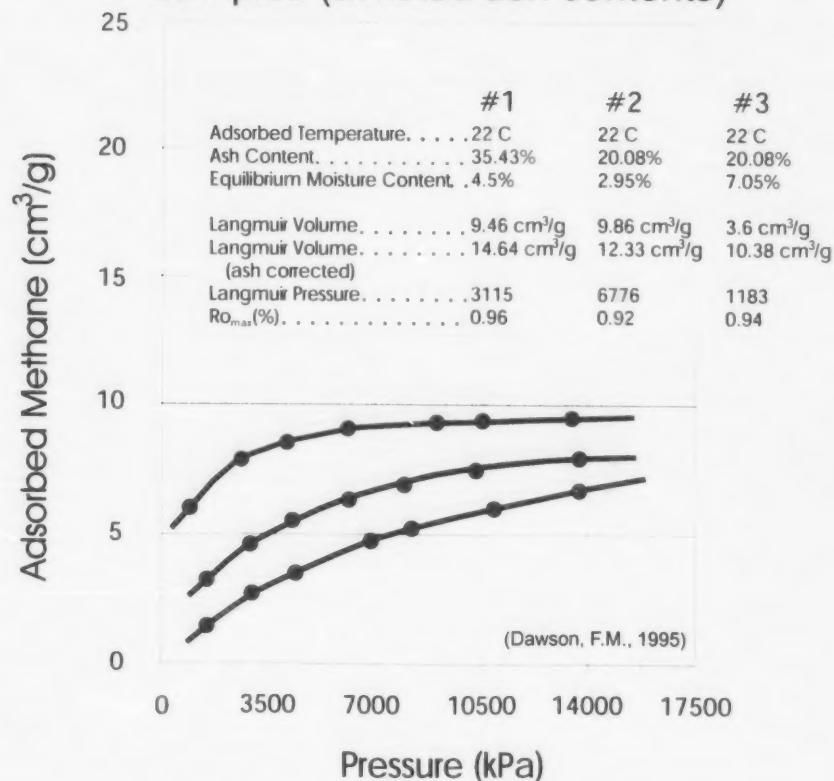


- High to medium volatile bituminous coal is contained within Lower Cretaceous Skeena Group
- Numerous coal seams range in thickness from 1 to 7 metres
- About 300,000 tonnes of coal were produced from 1918 to 1980
- A total surface mineable coal resource is estimated at 180 million tonnes and the potential resource available for coalbed methane is 862 million tonnes

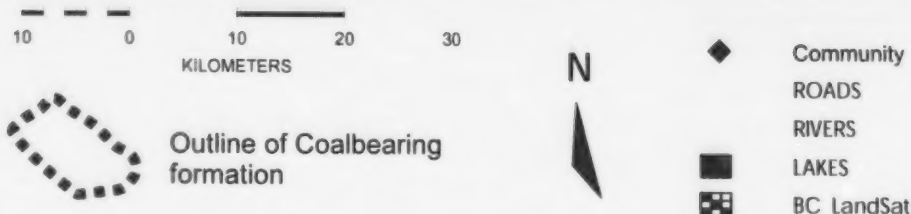
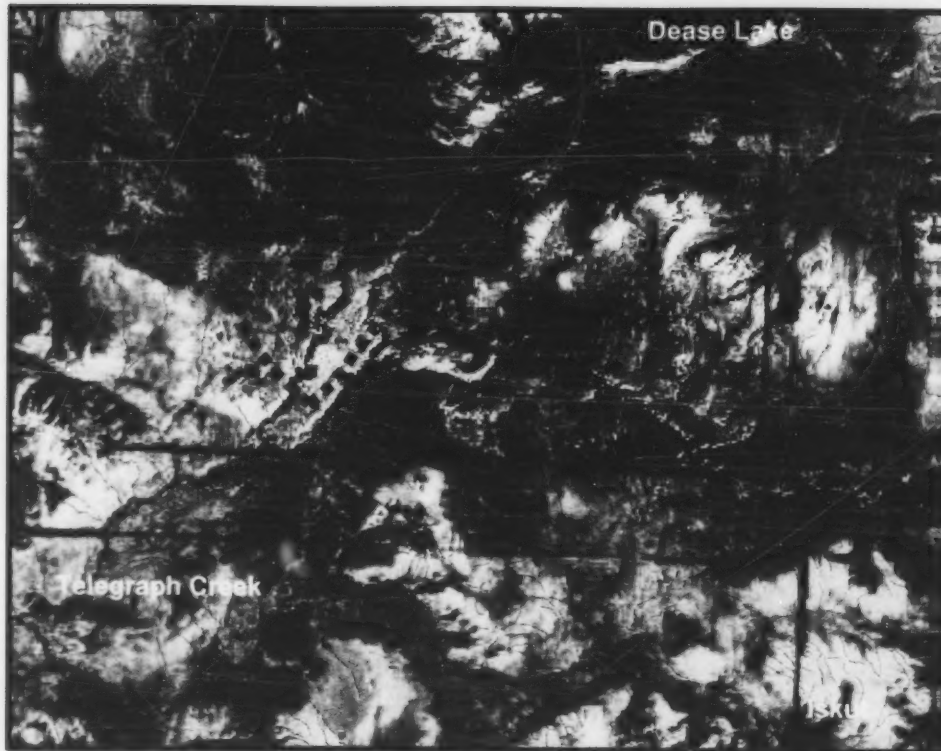
Telkwa Coalfield

- Samples from shallow borehole yielded an average coalbed methane content of $4.25 \text{ cm}^3/\text{g}$ (ash free basis) at depths of about 100 metres
- Three adsorption isotherms derived from core samples yielded an average Langmuir volume of approximately $12.5 \text{ cm}^3/\text{g}$ (ash free basis)
- Coalbed methane resource estimate for the Telkwa deposit is 0.13 Tcf (3.7 billion cubic metres)
- Permeability values of coal and rock range from 3 to 50 mD
- Proximity to Bulkley and Telkwa rivers suggest sufficient hydrostatic pressures exist to have retained significant volumes of methane at depth

Adsorption Isotherm of Telkwa Coal Samples (at listed ash contents)



Tuya Coalfield



- The Tuya River Tertiary basin is estimated to cover over 150 square kilometres with coal occurring in rocks of the Sustut Group
- The coal zone is about 100 metres thick and contains from 5 to 30 metres of coal with seams ranging up to 20 metres thick
- The structure of the basin is that of an open, northerly plunging syncline complicated by smaller scale faults and folds

Tuya Coalfield

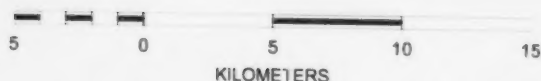
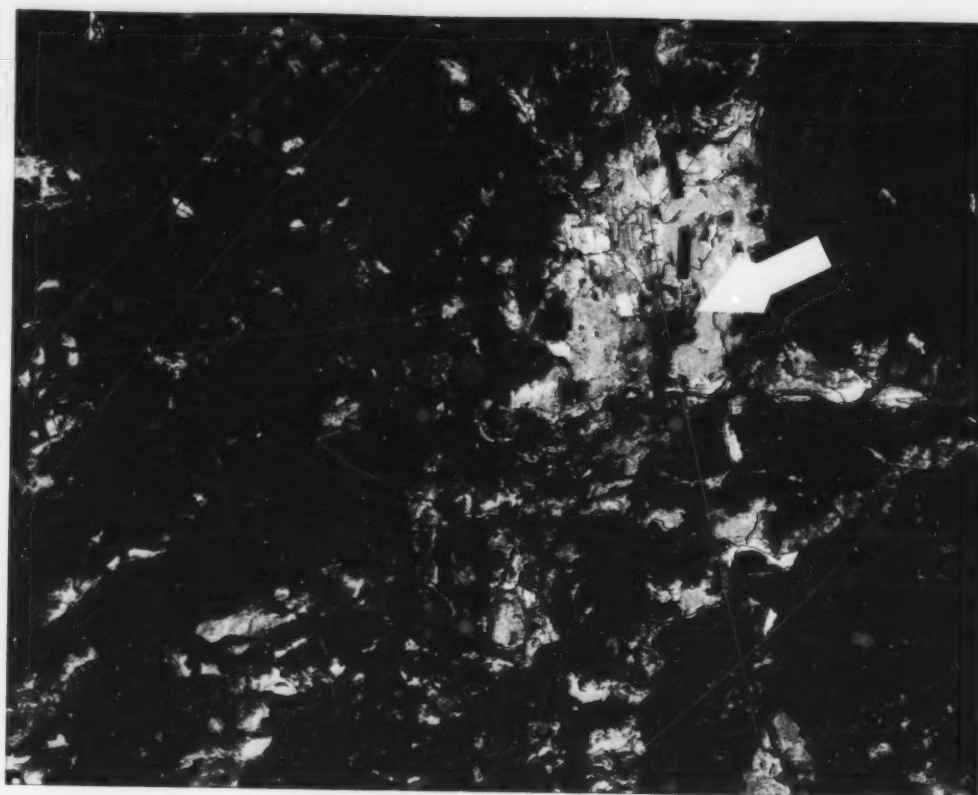
- The basin is estimated to contain up to 600 million tonnes of high volatile B bituminous coal
- A surface mineable coal resource of 200 million tonnes is outlined in the western half of the basin to a depth of 200 metres. No mining of these deposits has occurred
- A coalbed methane resource of up to 1.4 billion cubic metres (0.04 Tcf) may exist based on reasonable coal adsorption values
- Tertiary lignite coal zones ranging up to 4 metres in thickness occur about 20 kilometres southwest of the Tuya River basin (Tahltan)

	<u>Tuya</u>	<u>Tahltan</u>
Moisture	16.9%	22.0%
Ash	5.1%	21.8%
Volatile Matter	35.6%	26.8%
Fixed Carbon	42.4%	29.4%
Sulphur	0.9%	0.2%
Calorific Value	9680 BTU/lb	6480 BTU/lb

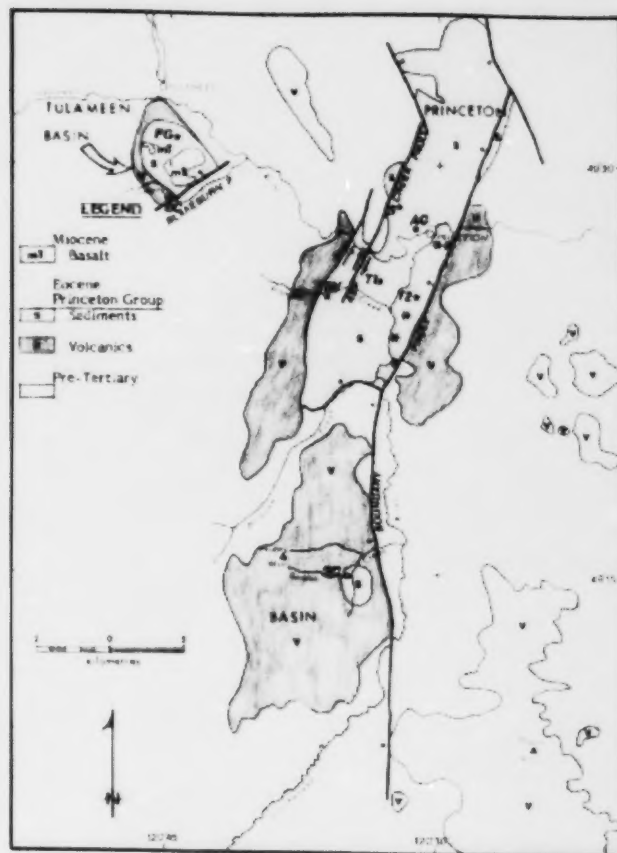
(Dolmage Campbell and Associates, 1975)

SIMILKAMEEN (PRINCETON COALFIELD)

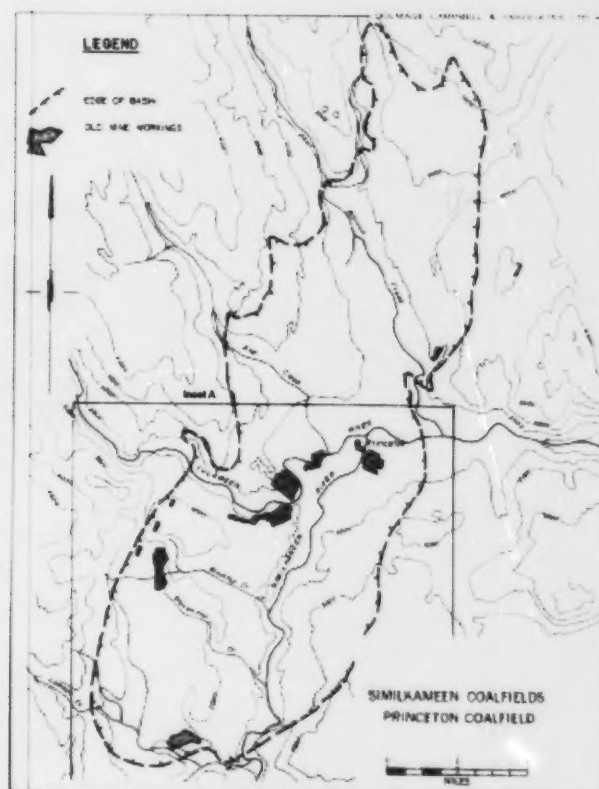
- Town
- ◆ Community
- ROADS (250)
- Railways (6m)
- Streams (1:50k)
- BC LandSat



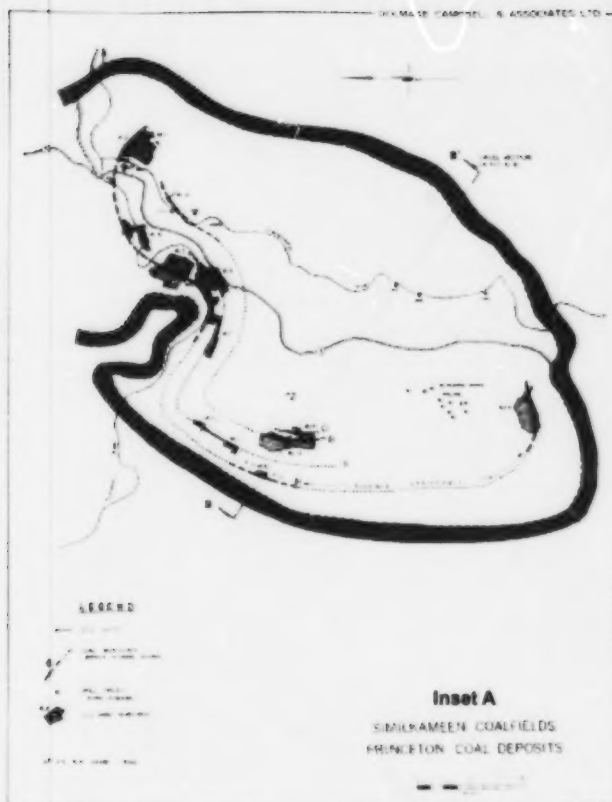
- the Princeton basin is a northerly elongated basin approximately 4 to 7 kilometres wide and 24 kilometres long covering a total area of about 170 square kilometres
- coal measures are middle Eocene age - the thickest coal seams occur near the middle of the coal-bearing Allenby Formation within the southern half of the basin
- four coal zones exist within a 520 metre thick stratigraphic interval - the lowest zone has been the most productive
- coal first reported in the area in 1860
- mining began in 1909, and by 1961 production totalled 1.87 million tonnes
- since 1951 there has been virtually no mining and only limited exploration in the coalfield
- ranks within the coalfield range from lignite to high volatile B bituminous - previous mining operations exploited coals classified between sub-bituminous A and high volatile C bituminous
- indicated resources are 10 million tonnes and inferred resources are 100 million tonnes
- the low rank, uncertain coal resource and discontinuous nature of the coal seams limit the coalbed methane potential



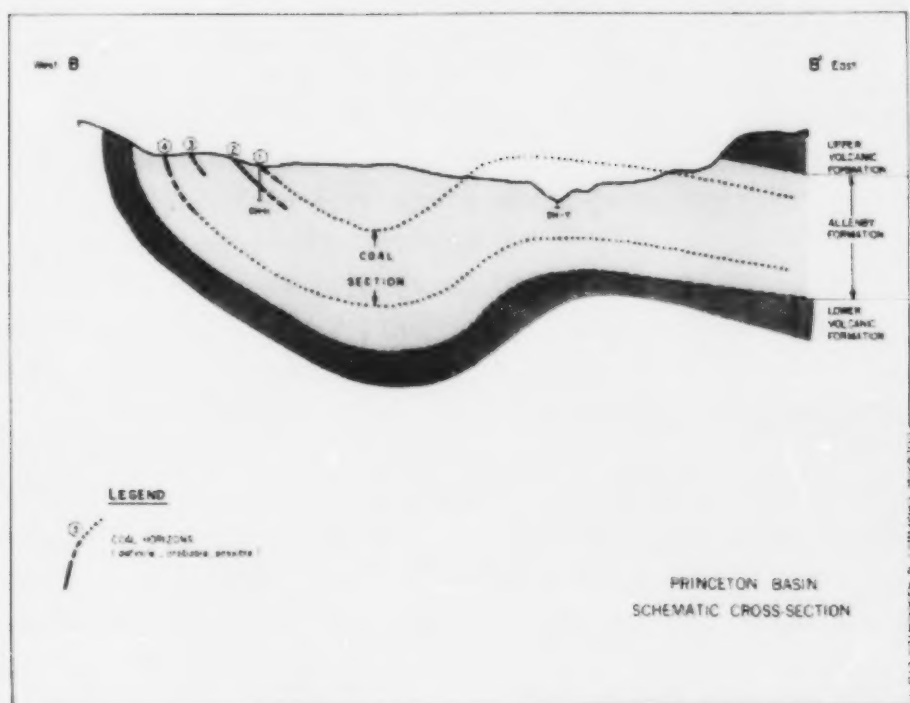
(Read, P.B., 1987)



(Dolmage Campbell & Associates Ltd., 1975)



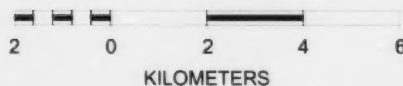
(Dolmage Campbell & Associates Ltd., 1975)



(Dolmage Campbell & Associates Ltd., 1975)

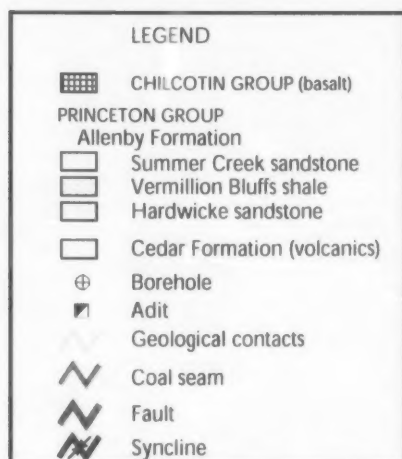


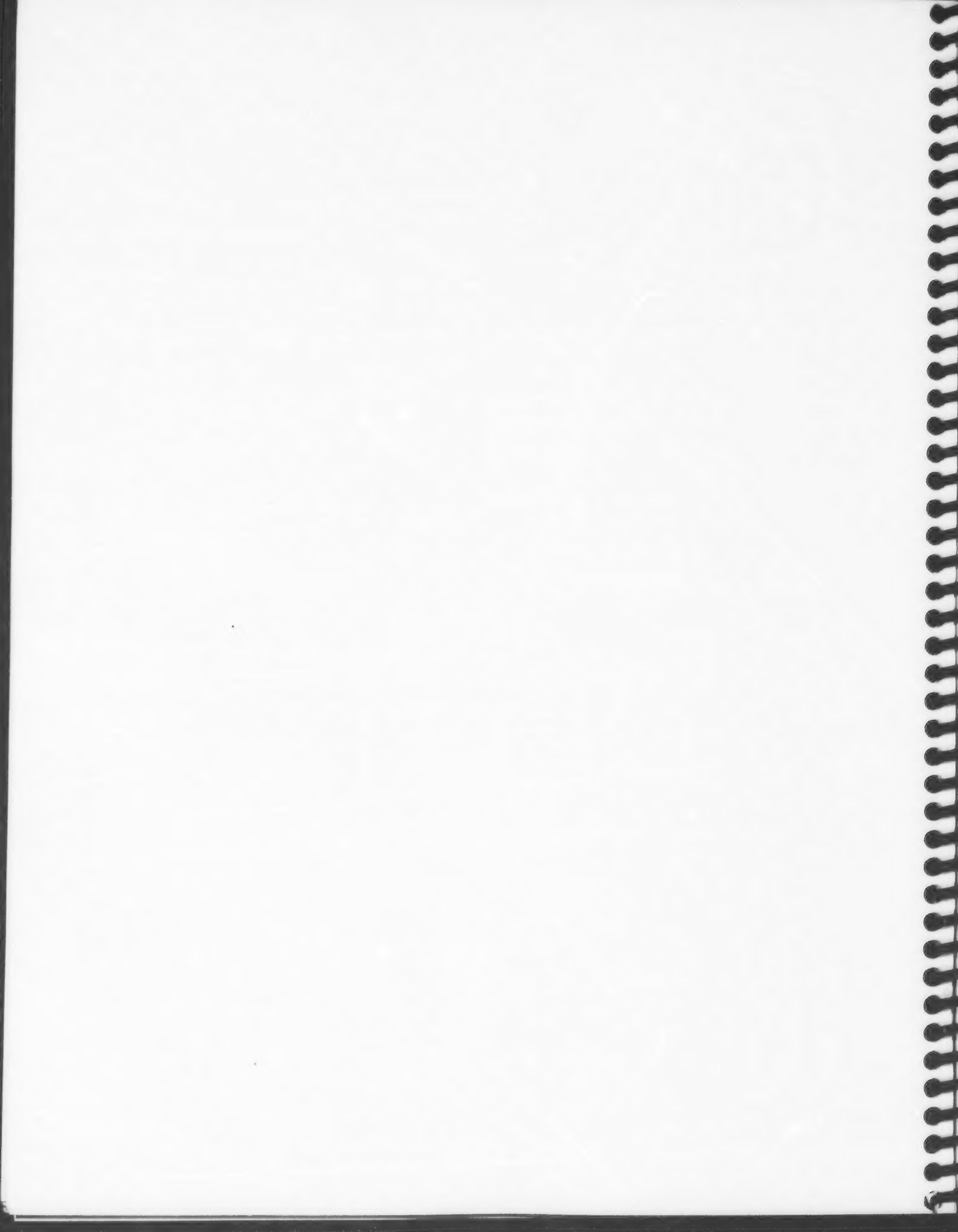
SIMILKAMEEN (TULAMEEN COALFIELD)

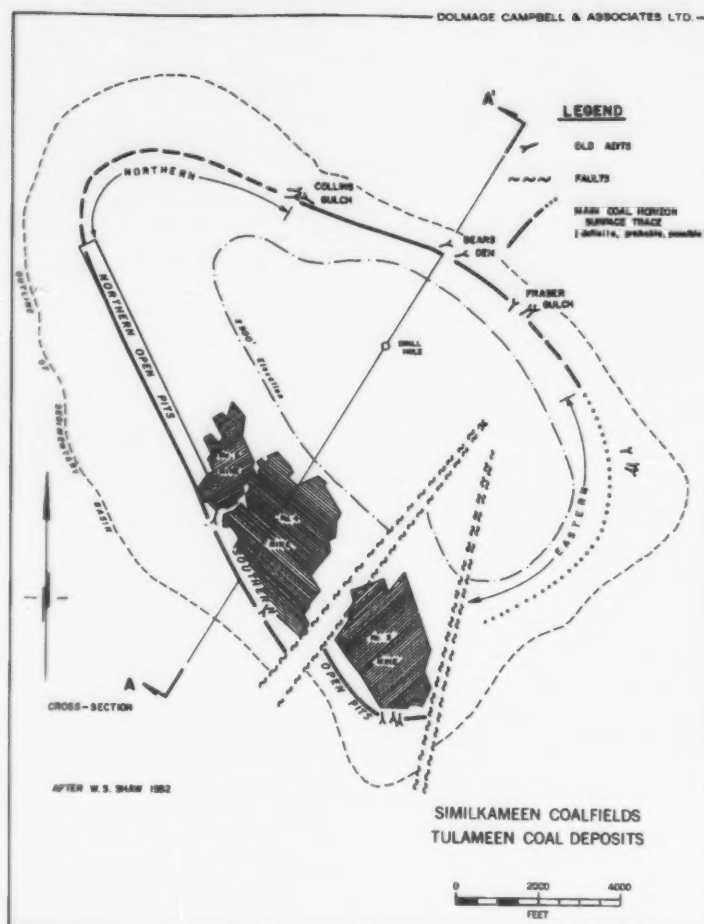


- Tulameen coalfield basin is about 5 kilometres long and 3 kilometres wide
- major coal measures are middle Eocene age - the sedimentary succession is assigned to the Allenby Formation and comprises three distinguishable units within a total interval of 840 metres
- coal occurrences in the region were known since 1885
- total coal produced was 2.1 million tonnes from 1919 to 1940
- the coal-bearing member is about 140 metres thick
 - 2 coal zones; upper averages 15 to 20 metres thick and the lower averages 7 to 8 metres thick
- rank of coal ranges from high volatile C bituminous to high volatile B bituminous
- measured resources are 20 million tonnes, indicated resources are 60 million tonnes and inferred resources are 160 million tonnes
- general structure of coalfield is a southeasterly plunging syncline with both limbs dipping about 45 degrees
- estimated coalbed methane resource of 0.05 Tcf is possible

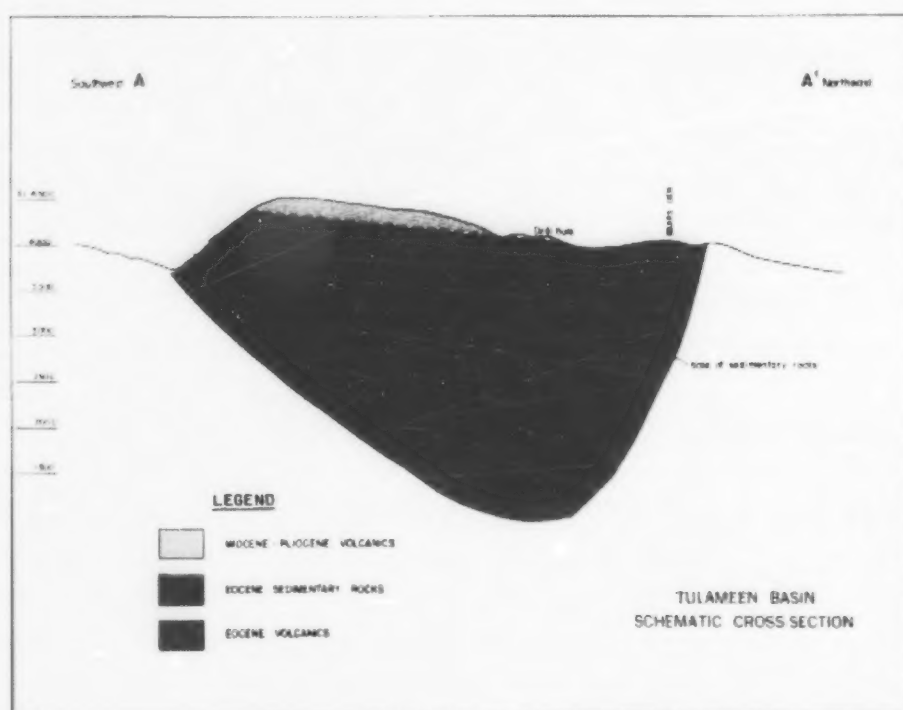
TULAMEEN COAL BASIN







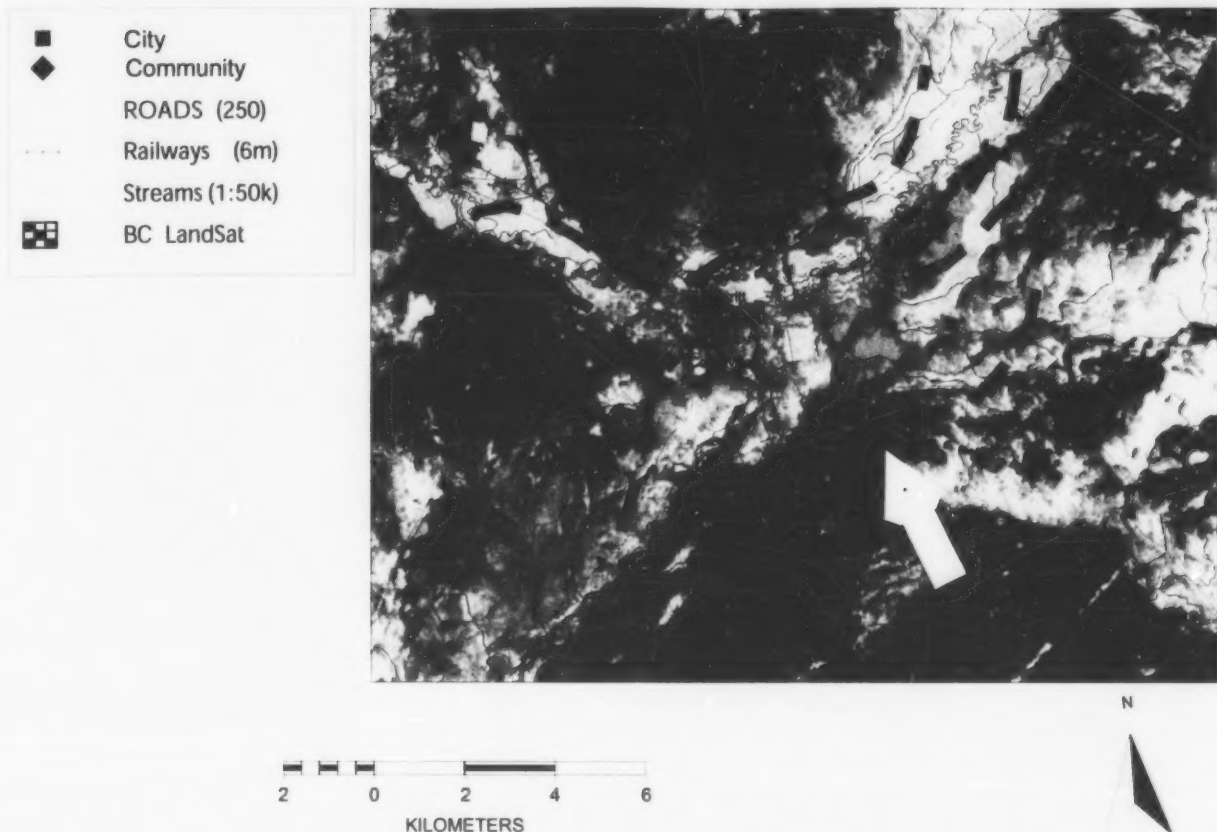
(Dolmage Campbell & Associates Ltd., 1975)



(Dolmage Campbell & Associates Ltd., 1975)



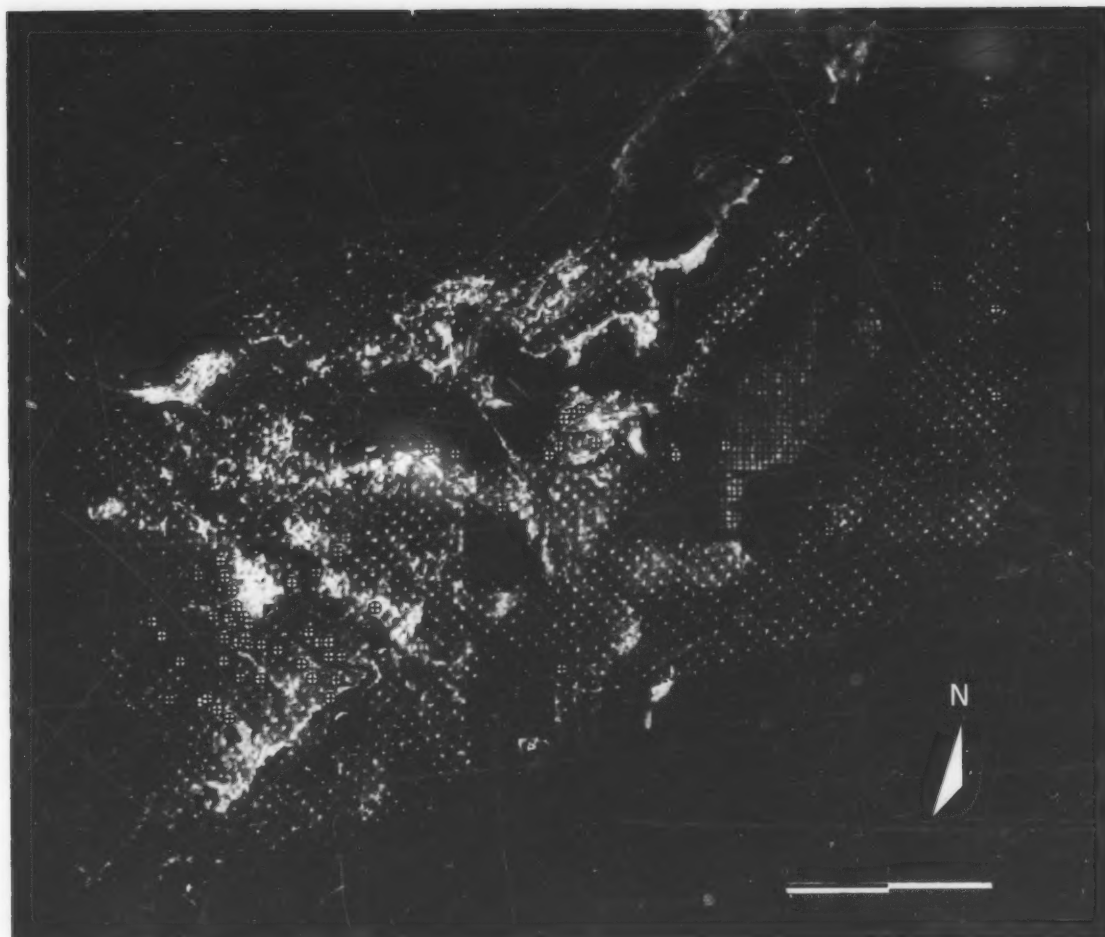
MERRITT COALFIELD



- coal occurrences first reported in the area in 1878
- about 2.4 million tonnes of coal were produced between 1906 and 1963
- Tertiary coal-bearing sedimentary rocks, assigned to the Coldwater Formation, occupy a northeasterly trending depression 11 kilometres long by 5 kilometres wide
- thick till covers much of the area, resulting in only sparse exposures of the coal-bearing strata
- highly faulted and folded strata characterize the structure of the measures at the western margin of the coalfield where mining took place
- coal seams appear to be variable in distribution and thickness - there appear to be 7 seams with a cumulative coal thickness of 22 metres in a 250-metre section
- the rank of coal ranges from high volatile C bituminous to high volatile A bituminous
- measured resources are 10 million tonnes, indicated resources are 20 million tonnes and inferred resources are 40 million tonnes
- coalbed methane exploration will have to address the structural complexity of the basin, lateral variability of the coal seams and the shallow depths of the coal measures



MERRITT COAL BASIN



LEGEND

 "Valley Basalt"

PRINCETON GROUP

 Coldwater Formation

 Volcanics

 Geological Contact

 Coal seam

 Fault (within basin)

 Fault (regional)

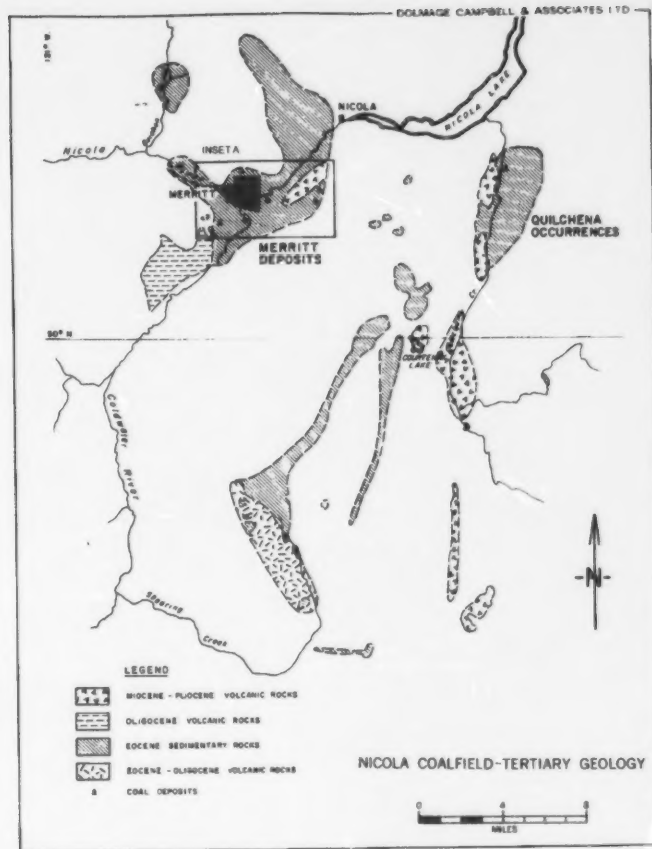
 Anticline

 Syncline

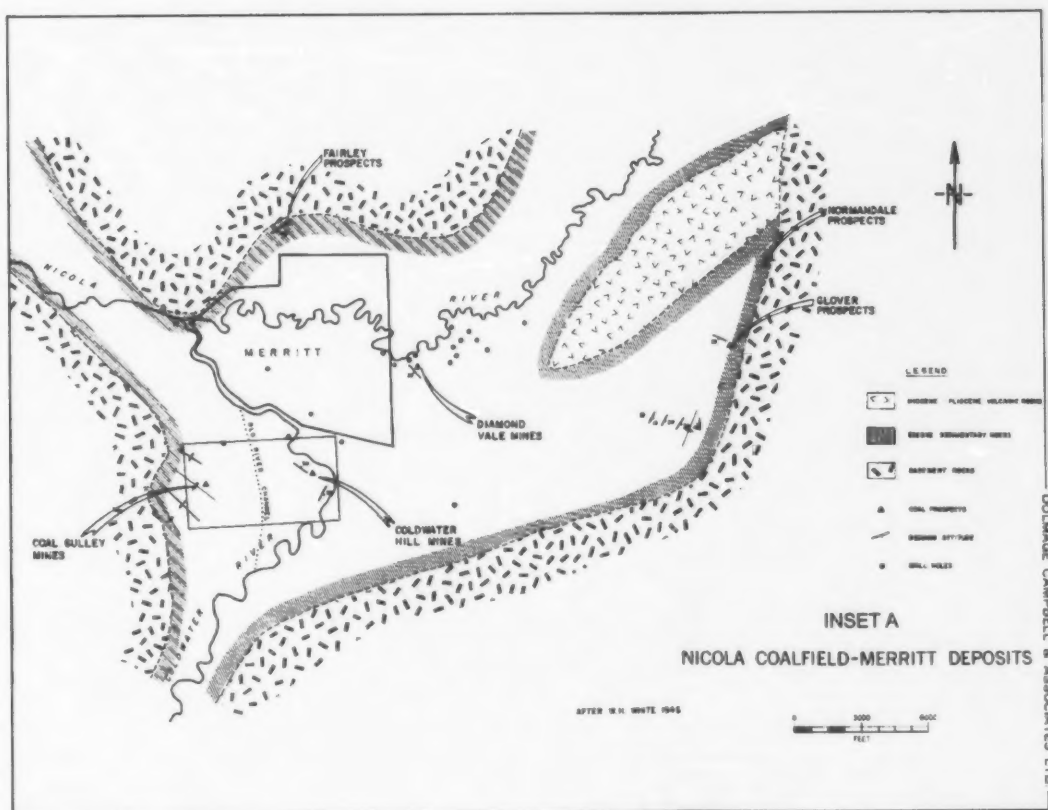
 Borehole

 Adit





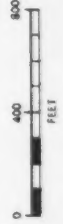
(Dolmage Campbell & Associates Ltd., 1975)



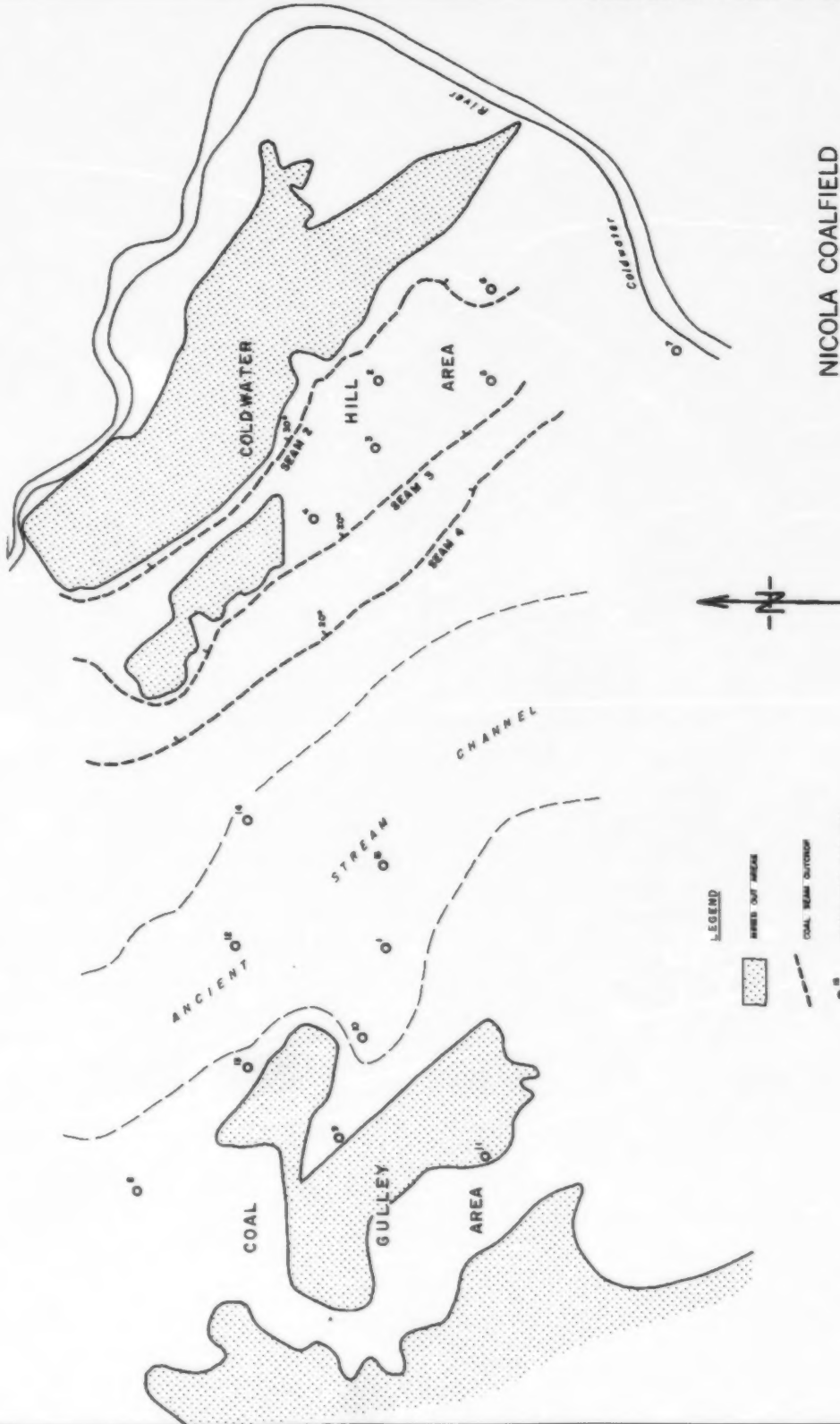
(Dolmage Campbell & Associates Ltd., 1975)



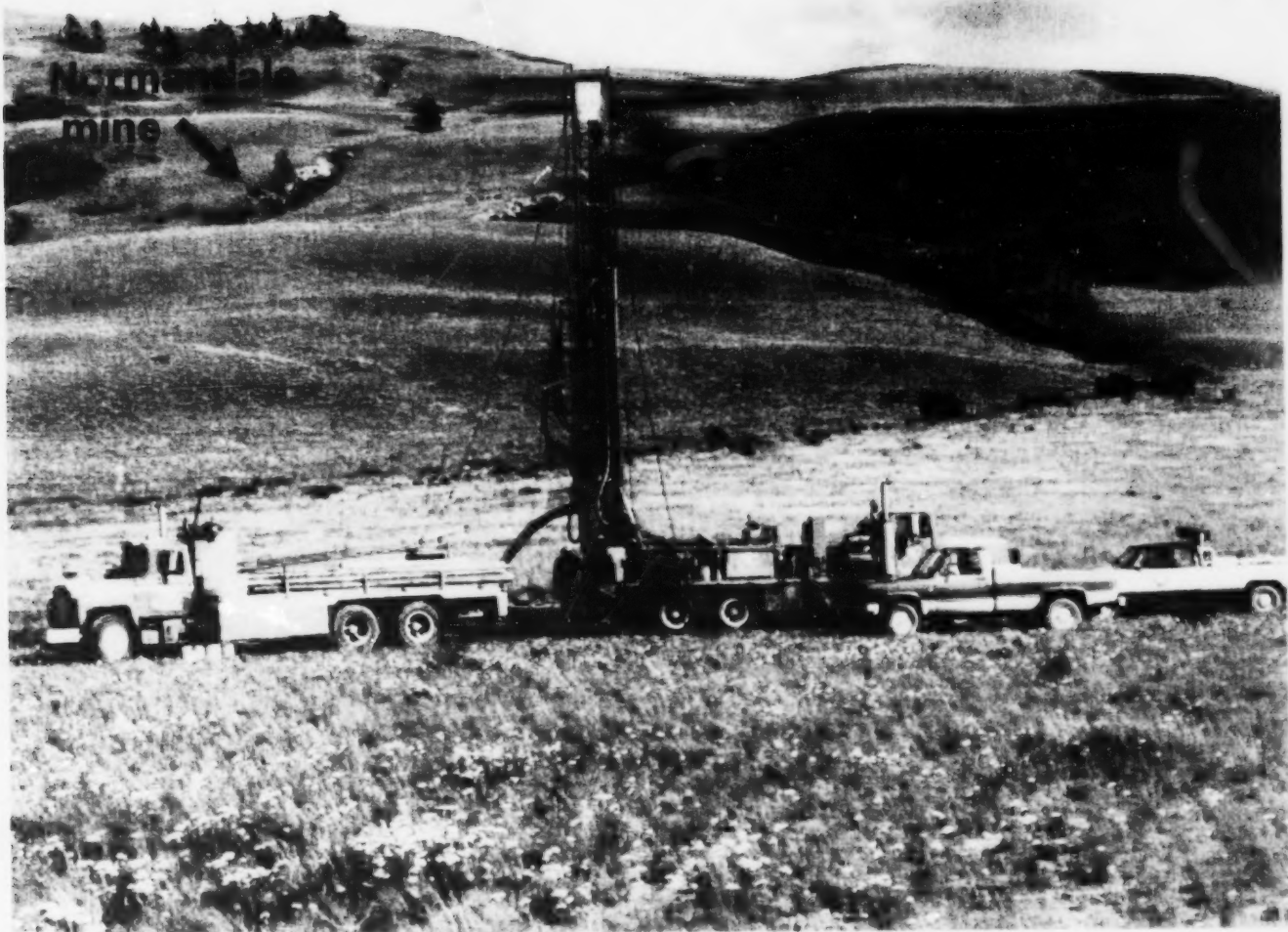
NICOLA COALFIELD COLDWATER RIVER MINES



(Dolmage Campbell & Associates Ltd., 1975)

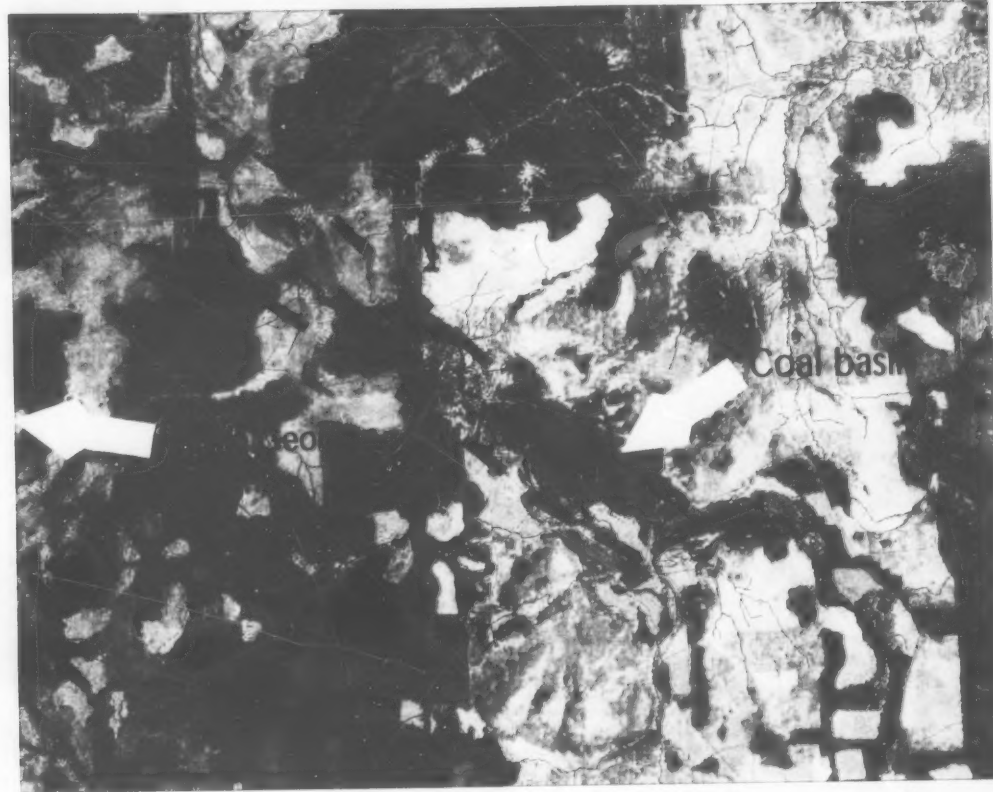






BOWRON RIVER COALFIELD

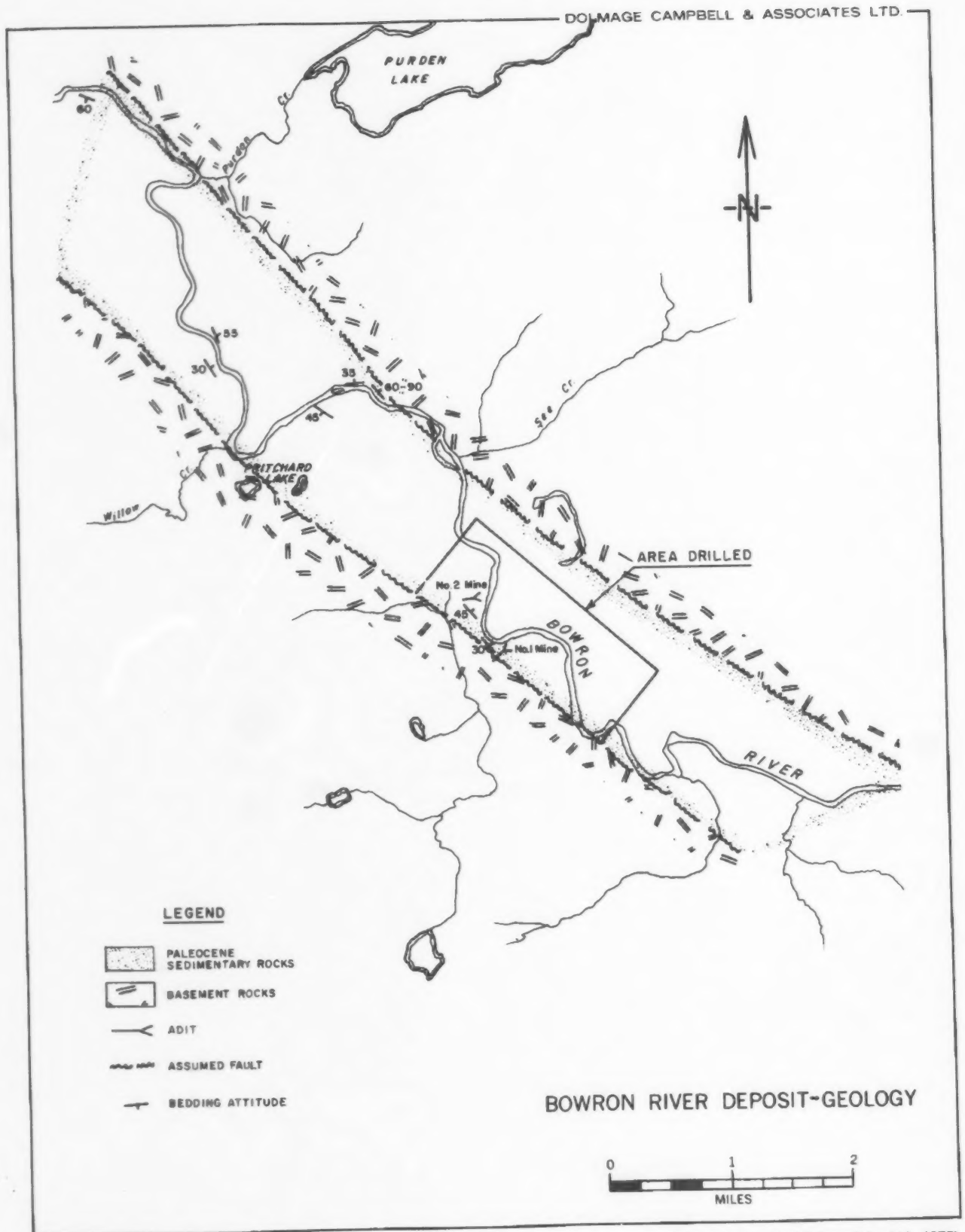
ROADS (250)
 Railways (6m)
 Streams (1:50k)
 BC LandSat



5 0 5 10 15
 KILOMETERS

N

- coal along Bowron River was discovered in 1871
- the Bowron River coal basin lies within an elongate graben-type structure, approximately 25 kilometres long and 2.5 kilometres wide
- Paleocene sedimentary strata is up to 700 metres thick - the coal zone, which is up to 35 metres thick and contains coal seams up to 3.5 metres thick, lies in the lower part of the succession
- coal rank is high volatile B bituminous and is characterized by a high (8 per cent) resin content
- the coal measure is significantly faulted and folded
- no exploratory holes have penetrated the centre of the basin where coalbeds are shallow dipping and reported to lie at depths greater than 200 metres
- measured resources are 10 million tonnes, indicated resources are 30 million tonnes and inferred resources are 30 million tonnes
- any coalbed methane potential will depend on the presence of biogenic methane though the presence of amber may help initiate generation of thermogenic methane at a lower rank



(Dolmage Campbell & Associates Ltd., 1975)

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Satellite image maps were compiled using the B.C. Ministry of Energy and Mines **MapPlace** site at www.em.gov.bc.ca/mapplace which provides interactive map-based access to Ministry databases